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ELECTRIC RAILWAY JOURNAL

13

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The Miller Trolley Shoe

Has Fewer Dewirements

In fact it practically never leaves the wire. Neither sharp curves nor poor overhead construction can shake its clinging contact.

That's why the one-man car operator likes Miller Trolley Shoes. He never has to climb out and replace the trolley in darkness or storm, as so often happens when ordinary trolley wheels are used. And thereby another element of danger is removed. In every way Miller Trolley Shoes are safer and cheaper than wheels.

Arrange for a trial.

Miller Trolley Shoe Company
Boston-21, Mass.
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MILLER
Trolley Shoes
(Patented)

— meet every requirement for increased efficiency.

1. The pantagraph applied to the trolley car.
2. Better current collector.
3. FEWER DEWIREMENTS.
4. Noiseless.
5. No lubrication.
6. Less wear in trolley wire.
7. More miles per dollar.

World-Wide ELECTRIFICATION

Southern Pacific Railroad

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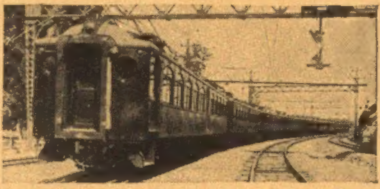
Chichibu Railway of Japan

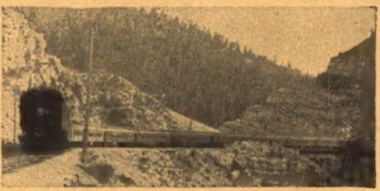
Norfolk and Western Railway

Boston and Maine R.R. (Hoosac Tunnel)


New York, Westchester and Boston Ry.

Grand Trunk Railway

British Columbia Electric Ry.


Chicago, Milwaukee and St. Paul Ry.

Pennsylvania R.R., Tunnel & Terminal Div.

Italian State Railways

Pennsylvania R. R., Main Line, Phila.

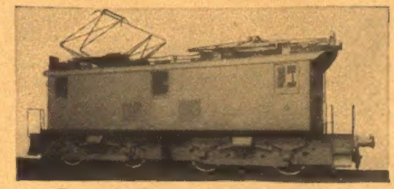
Paulista Railways of Brazil

Long Island Railroad

Chilean State Railway

Piedmont and Northern Railway

Visalia Electric Railroad


Buenos Aires and Western Ry.

Westinghouse Electric & Manufacturing Company

East Pittsburgh, Pa.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

Westinghouse

Vol. 60, No. 10 New York, September 2, 1922 Pages 315-346

ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE, Editor

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A Man With 6,000 Bosses

THE editor returned from a recent week-end of fishing. He was filled with the serenity of Izaak Walton and the philosophy of Grover Cleveland. He needed the latter. Three letters down from the top of the pile of mail on his desk was a bilious communication asking the editor if he had read "A Nose for News." This is a story published in the *Saturday Evening Post* for Aug. 12. The gentle hint was implied that here was an article the editor needed to read. It would do him good. Of course, the editor had read it, never dreaming that the story had any special significance for him. He thought that he had a pretty good nose for news. Various and sundry other communications claimed the editor's attention. Then another letter. It seemed that the plaint of this writer was that the editor had published too much, or given the wrong angle to what he published. In a way the editor's nose for news was, perhaps, overdeveloped and he was being imposed upon without knowing it.

Now an editor is an average human being, only more so. He makes mistakes. And they are in black and white for the present generation to see and for posterity to disinter. In this respect the editor differs from most other mortals. A doctor, you know, when he makes a mistake buries the victim. An editor, however, when he makes a mistake creates a Frankenstein that haunts him for days and months. With some readers, the idea prevails that an editor ought to refute everything. Others hold that he ought to believe nothing.

Every week the editor works for 6,000 bosses. And you, gentle reader, are one of the 6,000 bosses he tries to please. The paper is made by the editor for you.

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(Published in Chicago)
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(Published in London)

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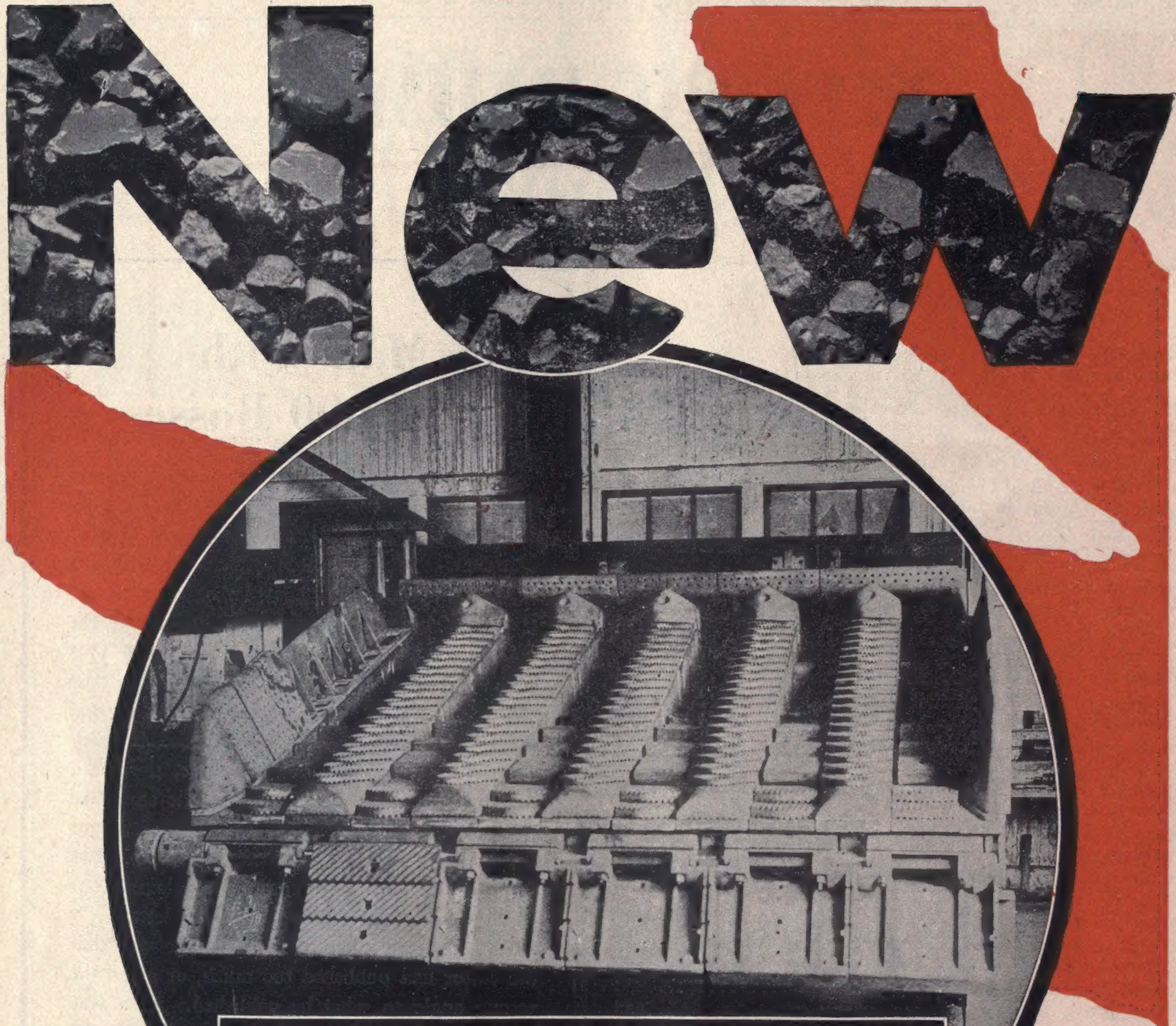

After six years of research and test work, during which time several distinct experimental stokers were built, Westinghouse has perfected and placed on the market—

**THE NEW MODEL
WESTINGHOUSE
UNDERFEED STOKER**

The development of the new stoker means the attainment of—

1. The widest possible fuel-burning range, and
2. The highest possible combustion efficiency.

This stoker will burn efficiently all grades of coal from the best to the poorest.

The New Model Westinghouse Underfeed Stoker has such improvements as mark a distinct advance in the stoker art, while retaining the good features of the standard Westinghouse Underfeed Stoker.

Write our nearest district office for further information.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
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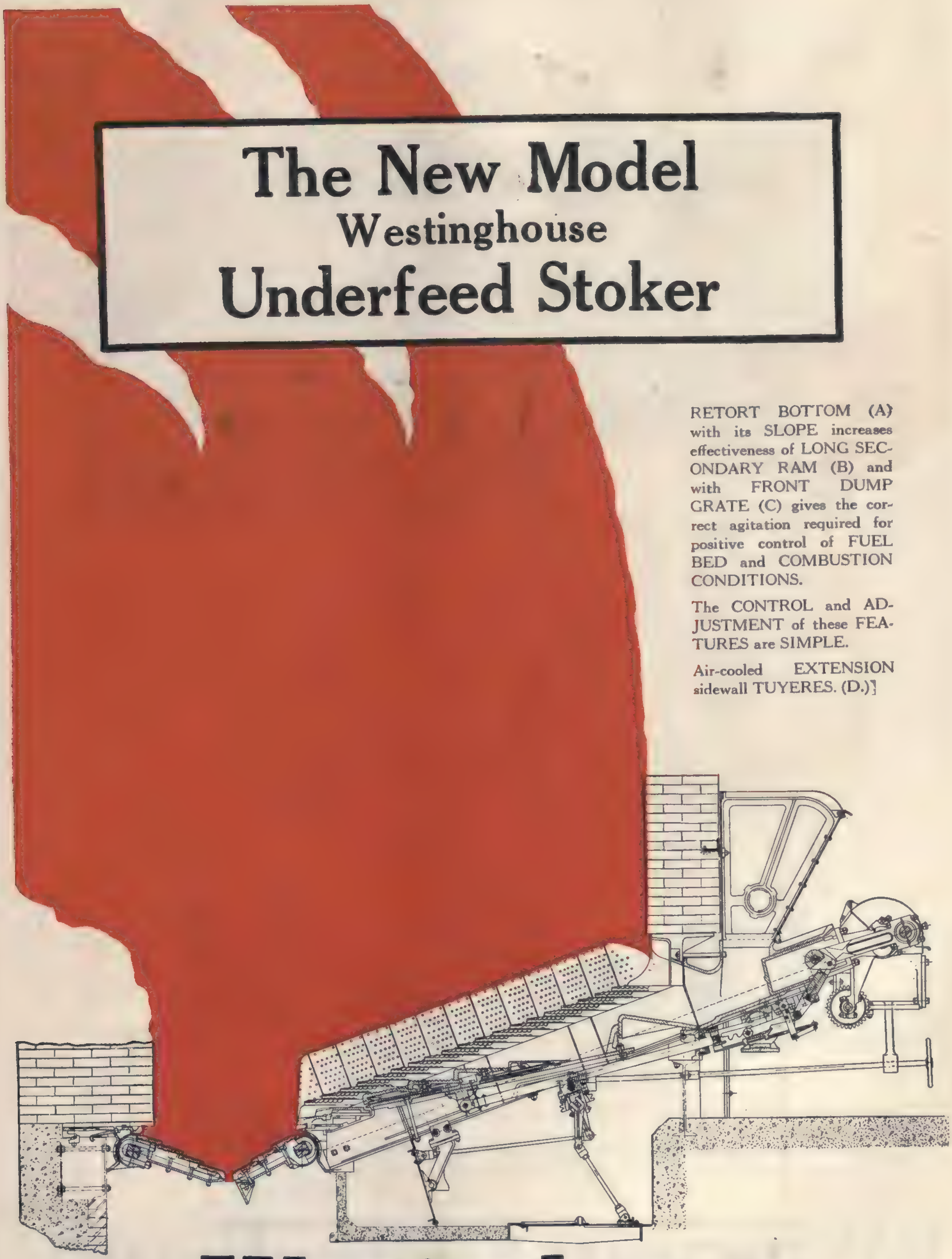
ELECTRIC

Westinghouse



The New Model
Westinghouse
Underfeed Stoker

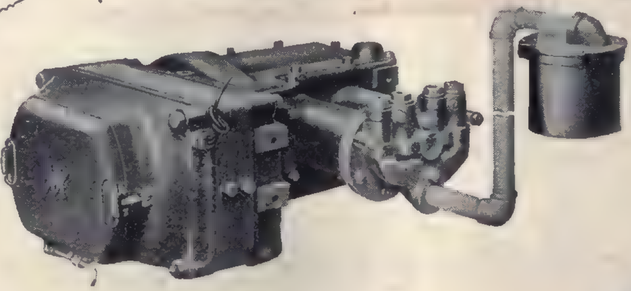
RETORT BOTTOM (A) with its SLOPE increases effectiveness of LONG SECONDARY RAM (B) and with FRONT DUMP GRATE (C) gives the correct agitation required for positive control of FUEL BED and COMBUSTION CONDITIONS.

The CONTROL and ADJUSTMENT of these FEATURES are SIMPLE.

Air-cooled EXTENSION sidewall TUYERES. (D.)]

Westinghouse

8-inch Suction Strainer applied to "Bungalow" type of Air Compressor



Give the Compressor The Protection It Deserves

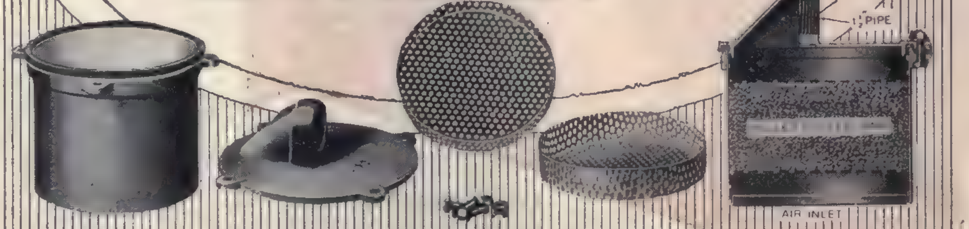
THE air compressor, as one of the most essential factors in modern railway operation, deserves adequate protection against any condition which may tend to affect its efficiency.

The Westinghouse 8-inch Suction Strainer provides positive protection against one of the commonest causes of complaint—that of dust and dirt being drawn into the compressor cylinders with the suction air.

All air used in compressors equipped with 8-inch Suction Strainers is filtered through a thick bed of pulled curled hair, thus insuring a state of cleanliness which adds materially to the life and efficiency of the compressor and reduces maintenance expense by permitting the lubricating oil to perform its intended function instead of becoming a gritty compound which cuts away the working surfaces.

The capacity of the 8-inch Strainer is sufficient to meet the requirements of any compressor having a displacement not exceeding 38 cubic feet per minute.

Descriptive Leaflet No. 2422, containing further information of interest concerning the 8-inch Suction Strainer, will be mailed on request.



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TRADE MARK

WESTINGHOUSE TRACTION BRAKES

ONE SAFETY CAR SELLS ANOTHER

THE numerous "repeat" orders for Safety Cars give unmistakable evidence of satisfactory service.

The Tampa Electric Co., of Tampa, Florida, one of the first companies to adopt this low-cost form of operation on an extensive scale, has recently placed a new order for 24 additional Safety Cars.

In Houston, Texas, the Houston Electric Co., already operating 60 Safety Cars, has ordered 70 more.

Many other companies which have had an opportunity to give the Safety Car a thorough test under all conditions of traffic are also extending this class of service, either by putting on new cars or rebuilding old ones for one-man operation by the use of our special Air Brake and Safety Car Control Equipment.

This equipment makes *any* car a Safety Car!

Ask us to tell you about the advantages of the new Selector Valve which gives independent door control.

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OF ST. LOUIS, MO.
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CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

Insurance plus
Marsh & McLennan Service

A Worth While Saving

The Service of Marsh & McLennan Engineers results in a direct dollars and cents saving in insurance cost.

A large eastern corporation, for example, was able to reduce its insurance cost from $17.50 per thousand to $4.30 per thousand, by carrying out the recommendations of our engineering service.

We will be glad to outline this service to business executives who are interested in reducing insurance costs.

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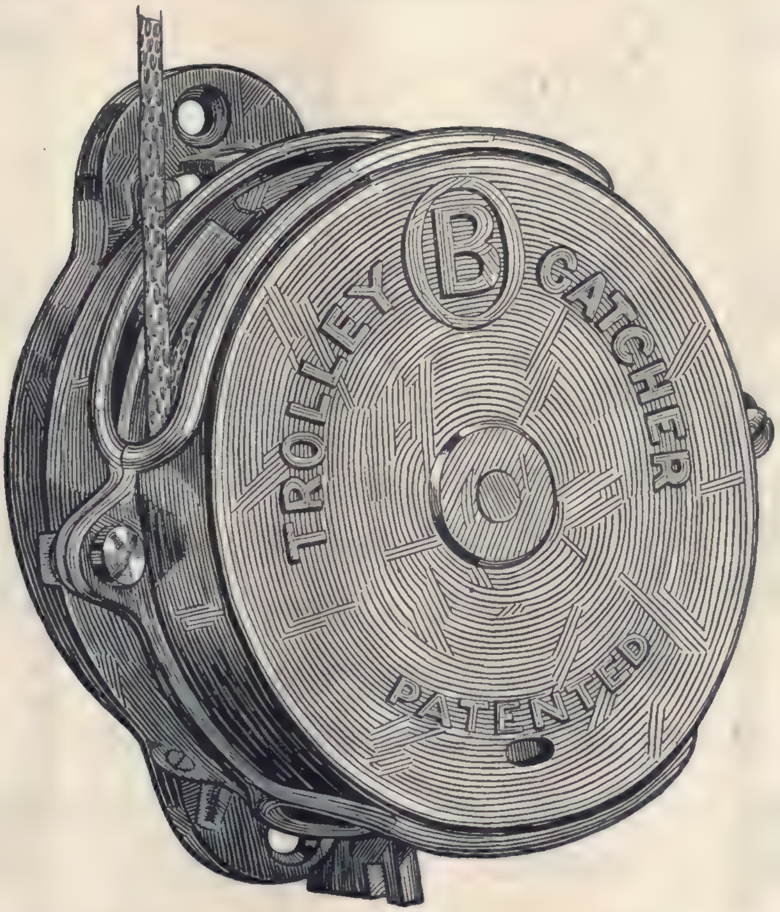

O-B Trolley Catcher
Guardian of the Rope

Put an O-B Catcher in charge of trolley rope on a car and it works every minute. It reels in the rope for low wires, pays it out for high—operates smoothly on dry days or slushy ones.

And if the pole flies, O-B Catcher stops the flight instantly and positively. Due to an inbuilt feature, the rebound of the pole cannot loosen the hold of the O-B Catcher.

O-B Catcher works smoothly and well because it is simple in design. It works long and reliably because it is rugged. If repairs are necessary, you'll find that the new parts fit the first time. Ask any repair man what that means to him!

May we tell you more about O-B Catcher?

The Ohio B Brass Co.
Mansfield, Ohio, U.S.A.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION 1922

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Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

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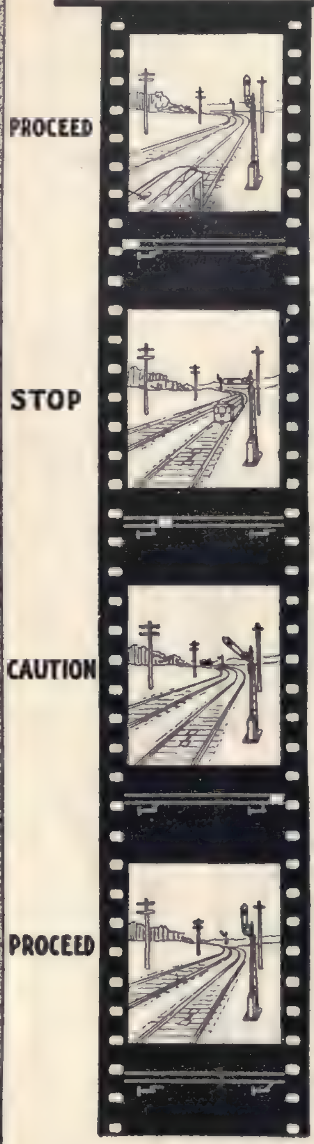
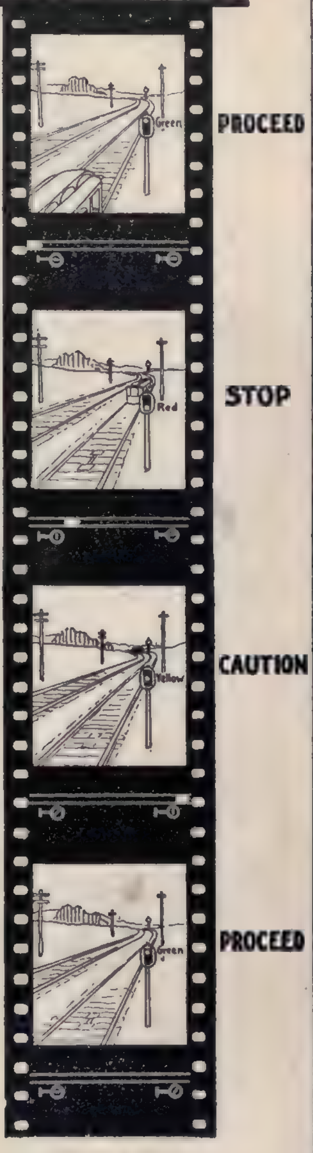


LIGHT



FOR DOUBLE TRACK
Interurban Railways

Union automatic ▪ block signals ▪

afford a simple system of indications easily understood by trainmen.

The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.

On the New York State Railways

On the San Francisco-Sacramento Railroad

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line.*

Trade Mark

Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark

A Big Year in Track Construction

is a big year for

STEEL TWIN TIES

MORE paved track is being laid this year than for the past five and, naturally, 1922 is a big year for STEEL TWIN TIES.

From San Diego, California, to Boston, Massachusetts, the initial economy and proven dependable performance of Steel and Concrete for track foundations have decided more and more companies for Steel Twin Tie Track.

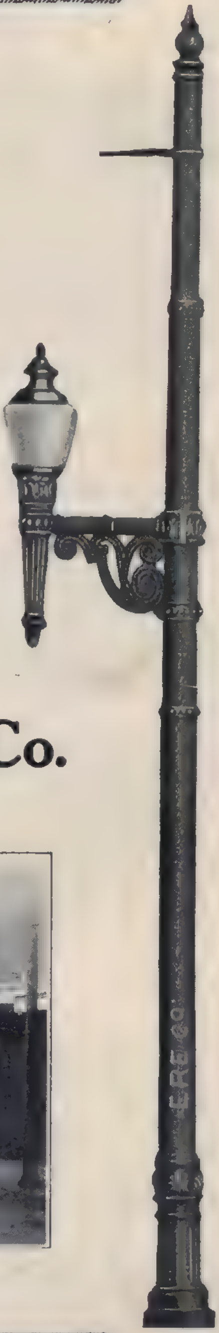
Lower material and labor costs say "Rebuild paved track *now!*" But select the type of paved construction with the lowest cost per foot per year.

For comparative records in your consideration of this question write today for our complete data folder. It presents details of the twelve-year record of Steel Twin Tie Track and includes an estimate of the cost of Steel Tie construction on your lines.

The International
Steel Tie Company
Cleveland, O.

Steel Twin Tie Track

ELRECO



Two-in-One

Railway span-wire supports and lighting poles combined—a sensible and economical policy for every city, town and public utility company to pursue.

In seventy different cities and towns they are using Elreco Combination Railway and Lighting Poles, with a substantial saving in money to all concerned and a marked improvement in the appearance of streets.

Handsome and efficient G. E. Novalux lighting fixtures are provided. The best is none too good for your city.

The leading features of Elreco Poles are—

Lowest Cost—Lightest Weight
Least Maintenance
Greatest Adaptability

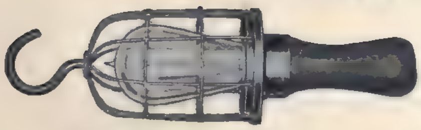
The Electric Railway Equipment Co.

Cincinnati, Ohio **30 Church St., New York**

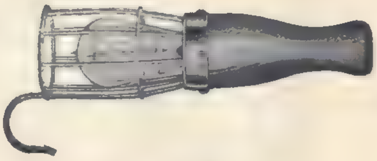
Miami, Florida

POLES

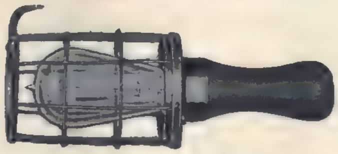
Keystone Portable Lamp Guards



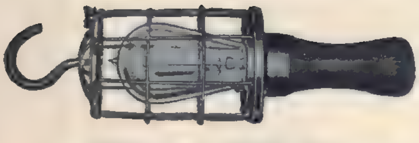
New Keystone Type



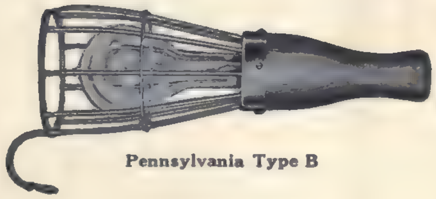
Pennsylvania Type A



ESSCO Type (open end)



ESSCO Type (closed end)



Pennsylvania Type B

Better light for winter nights

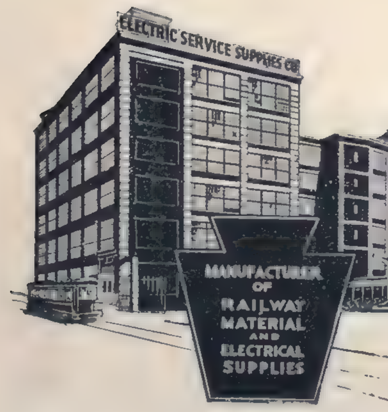
Better light because you can safely protect your highest candle-power lamp. Keystone Portable Lamp Guards are very strong and will stand a lot of banging around. They have the following mission to perform:

To light up dark places where men must work.

To make such work easier and production greater.

To stop lamp breakage and its frequent hazardous results.

Send for the data sheets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MANUFACTURER OF RAILWAY MATERIAL AND ELECTRICAL SUPPLIES

ELECTRIC SERVICE SUPPLIES CO.

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CHICAGO
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U. S.

Electric Signals

Operating cars on single track, without an efficient signal system, will cost you, sooner or later, a good round sum in damages when the inevitable accident occurs. Perhaps you have had one already. Look out for the next!

A very small amount invested now to purchase and install United States Electric Signals will be not only the means of preventing such a disastrous occurrence, but it will enable you also to speed up your line, to operate more cars on quicker schedules without double-tracking and without additional turnouts.

Get our estimate on a complete installation. You need signals!

and

Automatic Track Switches

Type 16

Quick acting electric track switches have become a real necessity in the operation of snappy, up-to-date service, especially where safety cars are used.

Our new Type 16 switch, recently placed on the market after exhaustive tests of many months' service on several Massachusetts roads, is of simplest construction, yet so rugged and so well-protected that maintenance troubles and expense are practically eliminated. The trolley contactor mounts on standard ears—a factor which will appeal to experienced line-men.

Electric switches—good ones—save time of cars on the road. *Speed up.*

SEND FOR FULL DESCRIPTION AND PRICES

For Faster and Safer Service

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

United States Electric Signal Company
West Newton, Massachusetts

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Foreign: Forest City Electric Services Supply Co., Salford, England

Millions for Tribute—

How Much for Prevention?

Millions of dollars damages have been paid by railway companies for boarding and lighting accidents. A few years ago, some of the wiser ones spent a little extra money to equip their cars with National Pneumatic door engines, door and step devices and other National Pneumatic accident preventers. Today they are reaping rewards in money saved, far beyond the cost of the equipment.

There is speed with safety in cars equipped with these devices. Let us look over your equipment problem with you and quote you on one or more of these successful safety features.

NATIONAL PNEUMATIC

Door and Step Control
Motorman's Signal Lights
Safety Interlocking Door Control
Door and Step Operating Mechanisms
Multiple Unit Door Control

In your plans for converting those old two-man double-truck cars into one-man units, safety demands pneumatic labor-saving accident preventing equipment. The National Pneumatic Line is peculiarly adapted to such work.

Write for particulars

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
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National Pneumatic Company, Inc.
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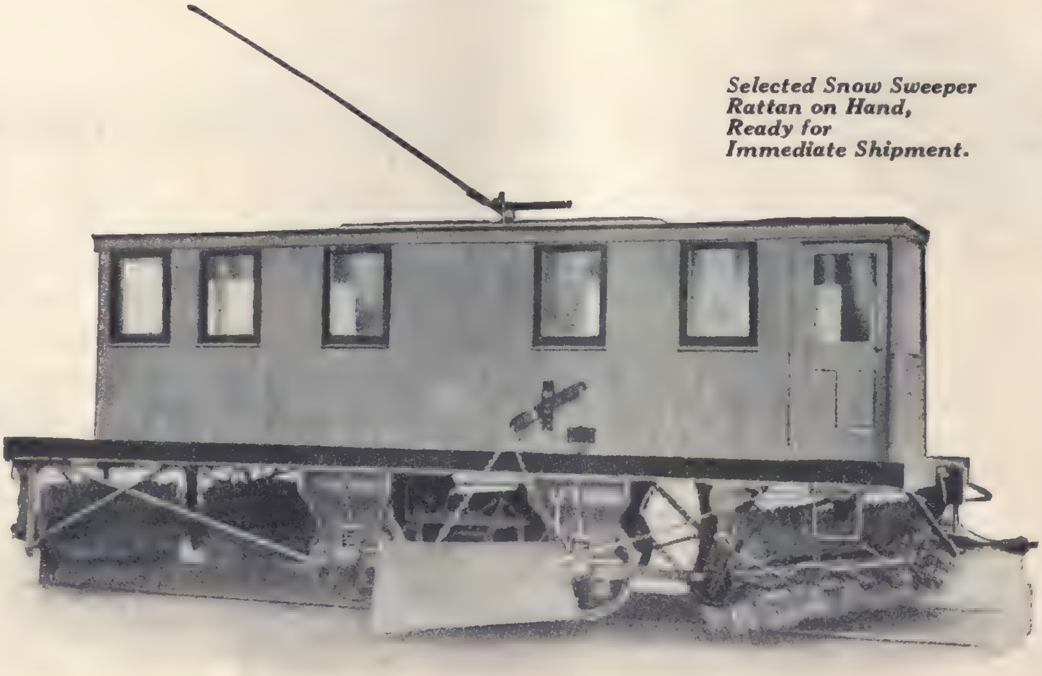
Edison Bldg., Chicago
Works: Rahway, N. J.

Snow Fighting Equipment



Selected Snow Sweeper Rattan on Hand, Ready for Immediate Shipment.

Standard Single Truck, Steel Underframe Long Broom Sweeper

Approximately ninety-five per cent of all the electric snow sweeping equipment, which is used in the United States and Canada, is of McGuire-Cummings make.

The car illustrated here is one example. The brooms are so arranged that they will clean both rails ahead of the car; the side plows will clear 4 ft. 0 in. outside of rails.

It requires two 25-hp. motors to propel the car, and one 25 to 40-hp. motor geared to drive brooms at 300 to 350 r.p.m.

Blueprints and specifications will be submitted on request.

End view of Standard Single Truck Sweeper.

McGUIRE-CUMMINGS MANUFACTURING CO.

GENERAL OFFICES

111 WEST MONROE STREET
CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars,
Snow Sweepers, Electric Locomotives.

Weighed in the Scales of Service

Lubricating oils are not a bit different from other supplies or equipment used by the street railway—they are worth what they return in service. The gallon of oil that gives one hundred units of service is worth two of the gallons that delivers but fifty, without counting the loss of time necessary for the extra application.

Service—and not bulk—must be the standard by which real value is weighed. When the "low service per gallon" that always results with the "low price per gallon" oils now marketed for railway lubrication are considered, the first cost feature is not so attractive.

Galena oils are sold on a closer margin of profit than any article of equipment that enters into street railway operation. They are the highest quality lubricants that can be manufactured. While their first cost to the railway is slightly higher than that of ordinary oils, their ultimate cost is far less when service is considered.

This economic feature of Galena oils has been demonstrated on hundreds of electric roads and the practical evidence of their matchless lubricating efficiency may be seen on any railway under Galena lubrication.

"It is not the gallon of oil,
but the service the gallon contains,
that counts!"

QUALITY-SERVICE-ECONOMY – GALENA OILS –

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities

A growing concern seeks its profit from increased, voluntary patronage—not from decreased service expense to unwilling patrons

Bulletin 44093
Sent Upon Request

Use Automatic Substations to Create Traffic

Like the safety car, the General Electric, automatic direct-current substation can be made a means for raising income as well as lowering outgo if part of its advantage goes into the production of more car-miles instead of the utmost in lowering expenses.

For example, the change-over of existing manual stations into an equal number of automatics will unquestionably produce large decreases in expense; but large increases in revenue can come only through a traffic-building policy. That means enough additional automatics to convert the savings in power, improvements in voltage and release of substation labor into service improvements that will attract every worth while patron.

Write us for up-to-date literature on Automatic Substations.

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Consolidation of Street Railway Journal and Electric Railway Review

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Volume 60 New York, Saturday, September 2, 1922 *Number* 10

Mayor Puts Forth Visionary Plan

MAYOR HYLAN'S transit plan for New York City has been made public. For five years he has been criticising every constructive suggestion made by others to improve the city transit situation. Now he takes some 8,000 words to describe the plan which he advocates, but omits to say whether this proposal is indorsed by any transportation engineer or is based on expert knowledge of traffic conditions.

Briefly, the Hylan plan calls for 126 miles, seven new tunnels, a bridge, the recapture of 97 miles of existing subways or all of it the city under its present franchises can take over, the establishment of a $25,000,000 bus line and the scrapping of a large part of the existing surface lines and elevated lines in Manhattan. Altogether, the Mayor says that this work can be carried out for $600,000,000, but it has been estimated in the offices of the New York Transit Commission that the cost would be well over $1,000,000,000.

Fortunately, there are many things to intervene between the proposal and its consummation. In the first place the Board of Estimate has to be convinced in its favor, and then the state authorities, who probably will be far harder to convert. Then there are such uncomfortable barriers to pass as the constitutional debt limit, with final compensation to present owners of property scrapped. Probably Mayor Hylan realizes these difficulties as well as any one else. That is one reason why the plan has advantages as a campaign issue. It can be kept in that capacity for years before a spade has to be thrust into the ground.

The Rio Engineering Congress and the American Electric Railway

MANY railway engineers do not realize the importance, at least to South Americans, of the International Engineering Congress at Rio this month. It is being held in connection with the Centenary Exposition in that city of the declaration of independence by Brazil from Portugal in 1822, and the engineering congress is the first of an international nature to be held on South American soil, just as the exposition is the first one, international in scope, to take place in South America.

According to tradition, Paris is the center of culture for the Latin world, and this is perhaps one reason why the South American engineers in the past have looked largely to France for inspiration. There are other and stronger reasons, however, constantly becoming more controlling, which dictate a closer connection with the engineering profession of this country. One of the most important is that the conditions in South America, with its great distances, comparatively scanty population and undeveloped resources, much more closely resemble those in this country than those which exist in any country in Europe. The second is the ever-growing number of engineers in South America who are graduates of our engineering schools. Hence in electric railway practice it is safe to say that each continent can learn something of the other's practice and that those south of the Isthmus will find much to interest them, particularly in the efforts toward electric railway standards being made in North America. The latest reports from Rio are that at least twelve countries are taking an active part in the engineering congress there, and as most of our engineering organizations will be represented at the Congress, it should result in a closer rapprochement between the engineers in both countries. It may even be that the American Electric Railway Association could with advantage to every one concerned include in its membership all of the larger South American systems. Two or three are already members and others might be induced to join if convinced that to those so far distant it was worth while.

Loyalty Means Nothing to Some People

THE electric railway industry has experienced during its history all kinds of strikes—those in which the company made vigorous effort to operate its cars and those in which the cars remained in the carhouse, those where the public supported the company and where it supported the men, strikes which lasted less than an hour and those which continued for more than a year. Nevertheless, a strike has been going on now in Buffalo for nearly two months, which is unique. Never before, probably, have the men in one city under the same management volunteered in such numbers to operate the cars in a city where a strike was in progress. Yet this is what is being done in Buffalo today by men from Philadelphia.

One of the labor papers professes it cannot understand such action. It points out that some time ago the plan was adopted of settling the wage to be paid in Philadelphia upon the average of the wages paid in Buffalo, Cleveland, Chicago and Detroit. Hence, in its opinion, the men who go from Philadelphia to take the place of the strikers are assisting "to crush the union that has helped to maintain the Philadelphia wages." In other words, it is thought unbelievable that the men in Philadelphia should help the management in Buffalo, Cleveland, Chicago or Detroit, because this action might mean a slight reduction in their own wages.

Such an attitude is unbelievable only to those who disregard two very important considerations. One of these is the realization which has come in Philadelphia, as well as in some other cities, that the prosperity of the employer and that of the employees are very closely associated; hence self-interest prompts each to promote the welfare of the other. The other consideration, ignored by those who cannot understand the action of the Philadelphia men, is that of loyalty, where loyalty calls for some effort. Of course, to some this word "loyalty" means nothing. But to the Philadelphia employee it means a great deal. This is shown by statements from some of the men who have gone from Philadelphia to Buffalo, as published in the P. R. T. "Service Talks." One of these follows:

> We of the P. R. T. came to Buffalo to show our belief in the Mitten Plan—in appreciation of what it has done for us and for the purpose of holding the Buffalo men's jobs open to them. The latter effort has been thwarted because the union successfully intimidated the men who desired to return to their old jobs. This has been easier of accomplishment by the union because of the foolish promises of protection, held out by Buffalo's Mayor, who seems trying to make good his pre-election pledges and his public promises to the men that the union would win.

The logical result of this feeling by the men from Philadelphia is manifested in the improved service given. In fact, the change in the demeanor and extent of the courtesy exhibited by the imported men in Buffalo, as compared with that previously shown, has been so marked as to attract favorable comment in the daily press. This is of course as it should be. It comes not only from an appreciation of past favors but from an intelligent self-interest, because a co-operating management and men can accomplish wonders in any industry.

Short-sightedness in the direction of an insistence on immediate gain has been the cause for frequent failure, not only of individuals, but of groups of individuals. It is the spirit which prompts the employee to do the work only "that he is paid for," that is to give the minimum which will be accepted for service without bringing immediate discharge. It is this spirit—the spirit which cannot understand the motive of the Philadelphia employees in operating the Buffalo cars—which is fatal to progress and prosperity.

The Three Dromios of Municipal Politics

AMERICAN political life presents strange anomalies. It would really seem that the larger the city the more nearly does it come to committing political suicide. Thus New York has its Mayor Hylan, Chicago its Mayor Thompson and Buffalo its Mayor Schwab. And the worst of these is Schwab, so they say. Of the record in office of Mayor Hylan little need be said. Of the record in office of Bill Thompson, particularly during the war, little need be said. But of the record in office of Mayor Schwab there is much to be said. He is the youngest in office of the triumvirate, but he is probably the deadliest of the three. All of them have been in office during electric railway strikes. All of them have been openly sympathetic with organized labor. It is no crime to sympathize with labor, but it is a crime for a man in public office to lend the weight of his authority to any cause not in the best interests of the general public. And this is what all of them have done, Mayor Thompson less spectacularly perhaps than the others. In short, all of them are traction baiters. And as such they are a mutual admiration society.

Hylan and Thompson did pretend to preserve a degree of decency in connection with their activities during the strikes in their cities, but Schwab has given Buffalo a terrible black eye. New York and Chicago by their very bigness may live down the disaster done by the election of Hylan and Thompson, but Schwabbery, as the Buffalo *Commercial* calls it, has made the name of Buffalo a stench in the nostrils of the whole country. Still it is difficult to keep from laughing when the correspondence is read which passed among these three Dromios congratulating each other on the success of the auto in meeting the need for transportation during the strikes which beset their cities. Of course, the classical allusion from the "Comedy of Errors" is distorted by the idea of the brothers being triplets instead of twins, but the idea is not destroyed that they are so much alike as to be mistaken for each other. When Hylan and Thompson and Schwab are considered, respect increases for the observation which led the late Viscount Bryce to question the capacity of the American city for self-government.

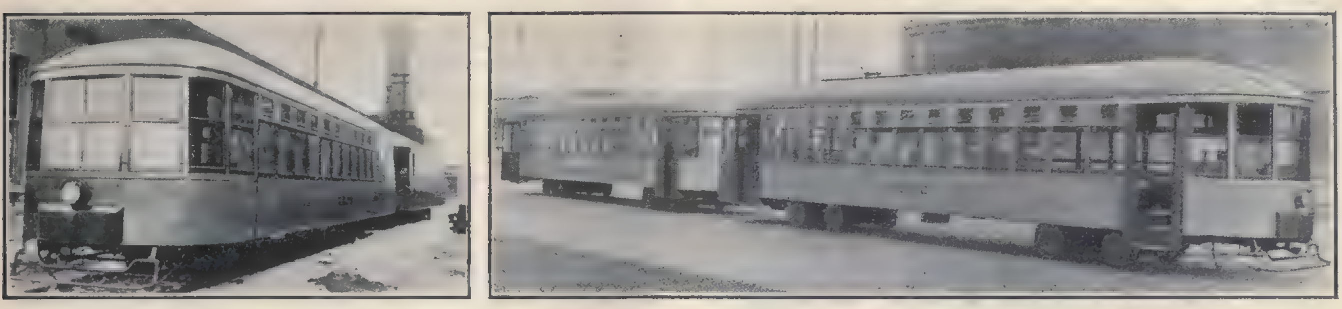
Convention Meetings at Chicago Should Function on Time

IT IS not too early to point out the necessity for all of the associations to economize time and begin their sessions at Chicago promptly, if the maximum results are to be obtained. Recent meetings of the several executive committees at which the programs for the different associations were reviewed show a wealth of topics and a need for as much time as possible for their consideration. It is a healthy sign that the work of each of the associations is expanding, but such a condition carries corresponding obligations. Possibly this expansion of scope during the past year is most evident in the case of the Engineering Association and is due in part to the fact that during the past twelve months the association's co-operative activities with other technical bodies have assumed unusual proportions and importance. It was apparent at Atlantic City last year that every available minute was needed to get through with the schedules of this association and even then a great deal of the discussion had to be curtailed, owing to lack of time. This year the situation is intensified to the extent that the number of topics to be considered has increased.

One most obvious way of gaining part of the greatly needed time is that the meetings shall begin promptly, and it is satisfactory to note that the Engineering executive committee has already decided that its sessions will begin on the minute of the announced time. Railway men are accustomed to operate their cars on schedule so there should be a ready response to this decision. Similar official action could well be taken by the other associations.

That such meetings can be held punctually and that it is worth the effort so to conduct them was evidenced in Chicago last March during the convention of the American Railway Engineering Association, where all meetings started on time to the second and where a very large program was fully covered within the time allotments, thus calling forth praise from many quarters. Electric railway operators will not be outdone by their steam road brethren and there is no doubt that an "on time" program for all the associations can be carried through. If figured on a financial basis, with the cost of the convention divided by the time available for sessions, the value of each minute will be found to be enormous. Of course, this is not an entirely fair method of evaluating the time because there are other benefits from the convention besides the sessions, but some idea of the importance of utilizing all of the time available for the sessions can thereby be obtained.

It therefore becomes a duty of every delegate at Chicago to do his bit by being on time when the meetings are called to order.



VIEWS OF BOTH SIDES OF THE TWIN CITY RAPID TRANSIT COMPANY'S TWO-CAR TRAIN

Two-Car Train Weighs 490 Lb. per Seat

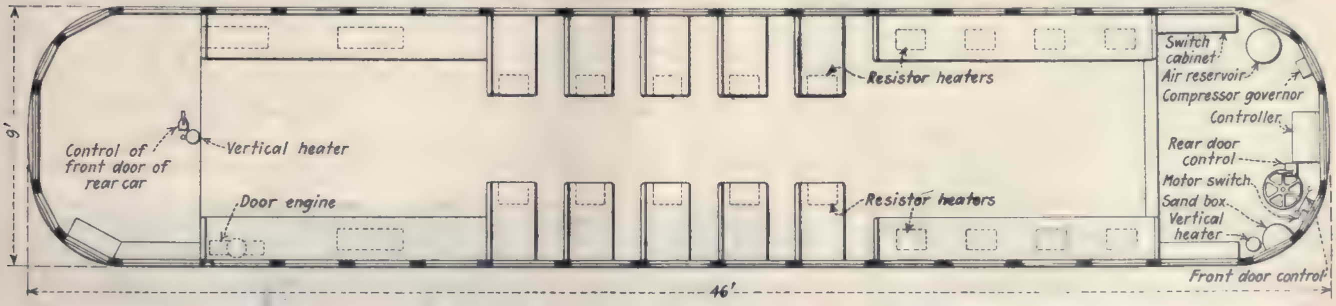
Experimental Two-Car Unit, Built by the Twin City Rapid Transit Company, Weighs 51,500 Lb. and Seats 105 Passengers—Has Low-Floor, Inside-Journal Bearings, Trucks Equipped with Band Brakes and Front Car Heated with Resistors

ONE of the big transportation problems that has arisen in St. Paul, Minn., during the past few years has been to route a sufficient number of cars through the congested business district in rush hours to remove the people from the street corners. On the basis that the solution rested not in adding to the number of cars, which would further aggravate the accentuated traffic conditions, but in increasing the size of each unit, the Twin City Rapid Transit Company has constructed a two-car train of new design. It is believed that train operation will prove a long step forward in the handling of travel on the heavy traffic lines in St. Paul. The operating results of this completed train on several of the heaviest traveled lines radiating from the business center of St. Paul has been so satisfactory that the company intends to construct a number of its future cars along the same general lines and use them on the denser traffic lines in Minneapolis.

The train consists of two motor cars, permanently connected by the tubular coupler. Each car is 9 ft. wide outside and 8 ft. 6 in. wide inside. Both cars are 46 ft. long and the over-all length of the train is 94 ft. The rear car seats fifty-seven people and the front one forty-eight people, a total seating capacity for the train of 105 people. The two-car unit weighs 51,500 lb., although it is hoped to incorporate refinements in future cars which will reduce the weight to about 23,000 lb. per car. Thus in the first design the low weight of 490 lb. per seat has been attained and if the contemplated design perfections are possible and feasible this feature will be reduced to about 438 lb.

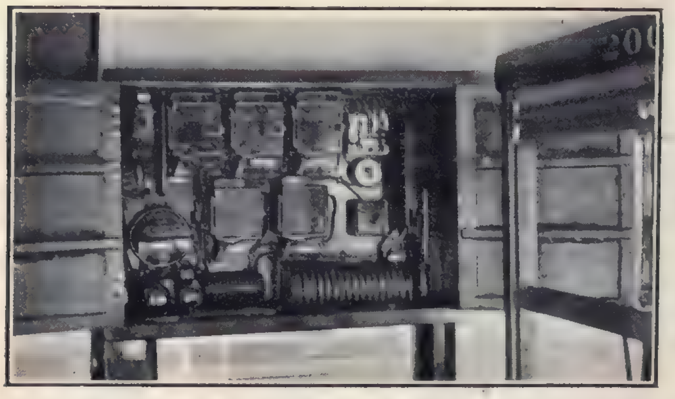
LOW-FLOOR INSIDE-JOURNAL TRUCKS

Numerous departures from standard practice have been resorted to in order to make the unit capable of swallowing a street corner crowd. With this purpose



PLAN OF THE FRONT CAR OF THE TWIN CITY TWO-CAR TRAIN

BOTH FRONT AND REAR CARS HAVE AMPLE AISLE WIDTH AND STANDING ROOM



CHOKE COIL, LIGHTNING ARRESTER, SWITCHES, ETC., GROUPED IN A CABINET ON THE LEFT SIDE OF THE FRONT PLATFORM

in view, standing room is liberal, doors are wide and the steps and car floor are low. The low floor height of 32 in. is the result of a specially designed truck having inside journals and band brakes and two 25-hp. safety car motors. The wheels are 26 in. in diameter and are mounted on hollow axles. The use of the compact safety car motor and the inside journal has left ample room for an 8-in. brake drum on each axle. The brake drum and band are not unlike the drive-shaft type in use on heavy duty automobile trucks. The elimination of brakeshoes has made for quiet operation and smooth stopping. Since a more durable material is used, the small amount worn away with raybestos lined hand brakes will insure that adjustments and replacements will be less frequent than with cast-iron brakeshoes bearing directly on the wheel tread. The additional life of the wheel was also a factor that was considered in the use of this type of brake. The truck bolster is supported by two full elliptical transverse springs the ends of which extend between the wheels. Placing motors on these trucks is carrying one step further the development of the inside-journal, low-floor trucks, which have been experimentally worked out in trailer operations during the past few years.

SEATS ARRANGED TO PREVENT CONGESTION

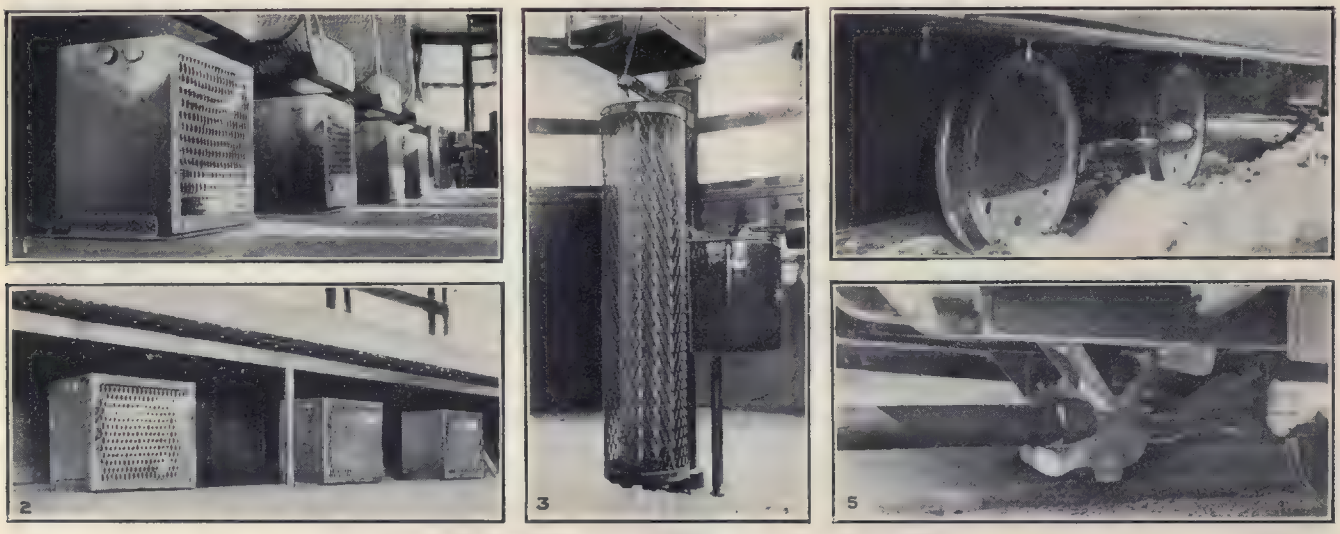
The seating arrangement and floor plans are shown in the accompanying drawing. Ten rattan cross seats of the non-reversible type with full spring cushions and thin backs are provided in each car. Longitudinal seats are placed at the ends to allow standing room and space for the movement of passengers. The platforms are dropped about 8 in. from the floor level and the step height is about 10 in. The step itself is about 14 in. above the top of the rail. Large loading platforms and low step heights were considered necessary to facilitate the speedy boarding of passengers. These cars have been provided with substantial double insulated floors and double sides up to the window line. The arch roof has a double ceiling and the windows are fitted with double sash. Instead of roof ventilators, ports with sliding glasses in cast aluminum frames have been placed above each window. The glass itself is held rigidly in the frame against a wicking insert by four brass fingers. The port can be opened and closed by means of a small knob inserted through a hole bored in the center of the window.

RHEOSTATIC HEATING USED

The resistors for the motors of both cars are used to heat the first car. A grid unit is bolted to the car floor under the end of each cross seat and four under each of the forward bench seats. Each grid is protected on the end and top by a metal housing, and the two sides are covered with a pressed metal grating to allow air circulation. Additional coil heaters to supplement if necessary the rheostatic heating have been placed under the rear bench seats, a vertical heater on the farebox stanchion on the rear platform and another against the car front forward of the front exit door. The rear car is completely equipped with standard electric coil heaters.

UNIQUE SCHEME OF DOOR CONTROL

The scheme of door control is distinctly unique. The double set of rear doors of the forward car are opened and closed by a door engine, the electric control for which is located beside the main controller at a convenient height for the motorman. The motorman operates it with his knee, and a mirror on the corner post enables him to see when all passengers have boarded. A similar knee-operated control mounted on the farebox stanchion of the first car and operated by the conductor opens and closes the front exit doors of the rear car. The doors at each end of the train are mechanically



RESISTORS USED TO HEAT CARS IN ST. PAUL

Nos. 1 and 2—All of the grid heaters are placed under the ends of cross seats and beneath the front bench seats.

No. 3—The electro pneumatic control of the front exit of the rear car and auxiliary heaters are placed on the farebox stanchions.

No. 4—The trucks have inside journals, band brakes and 26-in. wheels.

No. 5—Close-up of coupler connection.

operated by the conductor of the rear car and the motorman. Thus it is seen that each car is arranged as a rear-entrance, pay-enter, front-exit unit. The purpose of this method of door control was to divide the work more evenly among the three men and reduce the time occupied by these operations. Thus the two conductors are responsible for one door each while they are taking fares, and the motorman, otherwise idle when the train is not in motion, is operating two doors.

Ample Double Entrance Doors Inclose the Steps

Both conductors give their starting signals directly to the motorman by buzzers having distinctive sounds. Both of these are distinguishable from the stopping signal given by the passengers.

Practically all of the control and auxiliary equipment has been brought together on the front platform of the first car. Besides the controller for the motors of both cars, the air reservoir, the compressor governor, sand box, switch cabinet, etc., are arranged as shown in the car layout. The cabinet contains the choke coil lightning arrester, main switch, heater, pump, light, door control, switches, etc. Each car has an individual compressor attached to the under side of the body and the reservoir for the rear car is placed on end in the front platform, where the absence of other auxiliary equipment allows room for the end seat.

TUBULAR COUPLER CARRIES MOTOR CABLES AND AIR CONNECTIONS

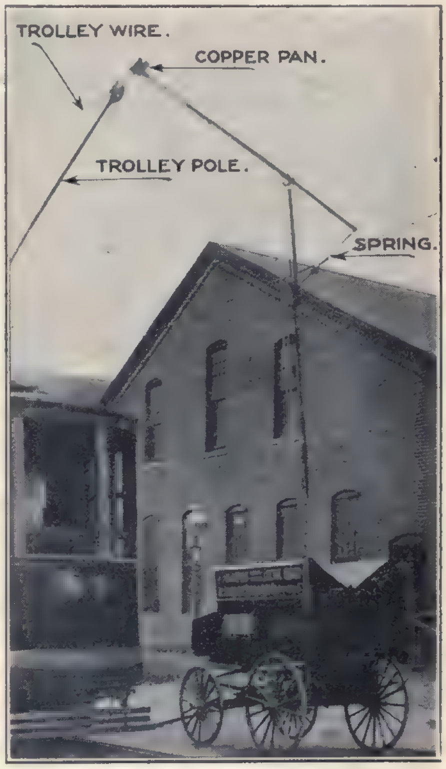
The method of permanently and safely coupling the two cars together has been worked out in a new way. The train connection is a tubular steel coupler through which are run the motor cables, bell wires and air hose. The connector is swiveled to each car through a four-legged frame riveted to the steel under-framing. An accompanying illustration shows the construction and fastening of the coupler. Both cars are equipped with emergency air valves which automatically apply the air in case the train connections should be broken.

Since the trial of this train began early last fall, it has lived up to its expectations in its ability to expedite rush-hour travel. Its operation has not been confined to one route; on the other hand, it has been operated on all of the downtown lines and at extreme peak-load traffic periods. At times over 250 passengers have been carried on one trip. Since there are no bulkheads, congestion has been moderated by the elimination of doors between the car body proper and the front and rear vestibules. This arrangement makes it easy for passengers to enter or leave the car and avoids congestion at the door opening. Such a condition is also alleviated by the ample design of the platform, for the body does not converge to the front from the end posts. The wide entrance doors also facilitate speedy loading. These cars are provided with wooden doors instead of wire gates, as has been the practice of the Twin City Rapid Transit Company in the construction of its city cars. Practically all the company's equipment consists of heavy single-end cars having an open rear platform, the steps of which are inclosed by either two or three double-folding wire gates.

Non-Interfering Trolley-Wire Connection for Arc Welders

Brief Description of a Device Developed in Brooklyn, N. Y., for Obtaining Current from Trolley Wire Without Constantly Removing Trolley Wire Connections

VARIOUS means have been developed for overcoming the necessity of constantly removing the usual pole and hook type trolley wire connection commonly used to tap the trolley wire for current supply to the various forms of arc-welding equipment used for track repairs. The accompanying view shows a device developed some time ago by the way and structures department of the Brooklyn Rapid Transit System, which has been found to serve this purpose very well. It consists essentially of a mast or upright, attached to the welding equipment, upon the top of which is mounted a lever arm having at its outer end a copper pan which fits under the trolley wire. The pan is grooved to permit the wire to fit into it, thus providing a smooth under run for the trolley wheel. This pan is of sufficient length so that lateral movement of the wire is minimized. It is held against the trolley wire by means of a spring attached to the short end of the lever arm. This spring has a tension which holds the pan against the wire at a pressure sufficient to prevent arcing and somewhat greater than that used for trolley poles on cars. When necessary the tension on the spring can be released and the lever arm lowered, or the entire lever arm and mast may be rotated.



Light and Simple Trolley-Wire Tapping Outfit

The mast is in two parts and the entire rig is made up with the view to portability and lightness. It was found after considerable experimenting that bamboo made the best material for this outfit.

Limit of Voltage in Conductor Rails

Author Gives Arguments Against High Voltage on Third Rail and Submits Calculations for a British Suburban Electrification Based on Long Island Railroad Data from 1922 Report to International Railway Congress

THEODORE STEVENS, a consulting engineer, of London, recently lectured on electric traction at the London County Council's School of Enginering and Navigation. He dealt especially with the risks involved in the use of high voltage in conductors near the ground. He quoted the opinions of other engineers from reports submitted to the International Railway Congress held in Rome during April. The French decision was that 1,500 is the maximum permissible voltage near the ground. For higher voltages overhead construction must be used. Excerpts from George Gibbs' report were quoted as follows:

> There are important objections to a third rail being used *for general electrification* . . .
>
> Serious consequences increase rapidly as the voltage in third rail is raised.
>
> Weighty objections to the use of 1,200 or 1,500 volts in third rail . . .
>
> Impracticable to install it within American railroad clearances properly insulated and protected in a manner which will adequately safeguard the public and employees.
>
> The decision which has been arrived at in England (Ministry of Transport's Electrification of Railways Advisory Committee's Final Report 1921) to allow the installation of a 1,500-volt third rail is, presumably, for special cases only and for operating conditions and clearances which do not exist in America.
>
> Overhead conductor promises to become standard for heavy electric traction . . . provides continuous contact at the train over complicated track layouts.

USE OF SMALL WHEELS REQUIRES MORE DISTANCE BETWEEN THIRD AND RUNNING RAILS

The lecturer, who has had both American and British experience, stated that the small wheels on much American rolling stock necessitate a greater space between third rail and running gage line than in England, but he knows of nothing to warrant use of 1,500 volts in a third rail near the ground either in England or America.

TABLE I—ESTIMATES FOR BRITISH SYSTEM BASED ON LONG ISLAND RAILROAD DATA

	Existing Long Island Railroad	Basis of Estimates Below
Route-miles	90	100
Single-track miles	227	200 plus sidings
Lines extend from terminus, miles	30	18
Motors cars	494	33 per cent fewer
Trail cars	140	15 per cent more
Number of substations	14	16
Substation plant, kw.	56,000	55,000
Miles between substations	4.5	same
Maximum trains per day	730	5 per cent fewer
Maximum peak load, kw.	34,400	15 per cent more
Rush-hour load, kw.	....	27,500
Passengers, 1920	59,134,000	....
Train-miles, 1920	3,769,000	50 per cent more
Car-miles, 1920	20,400,000	40 per cent more
Kilowatt-hours supplied, 1920	104,030,000	18 per cent less
Ton-miles, 1920	906,100,000	....
Maximum train weight, tons	672	45 per cent lighter
Average speed, m.p.h.	32	20 per cent slower

The most important consideration, in his opinion, is that to supply a third rail with 1,500 volts very seriously adds to the danger of employees on permanent way work, and to any other person who accidentally gets on the right-of-way. From this consideration the higher-voltage construction, he declared, is not justifiable even if cheaper to install or operate. That it is not cheaper, he showed by estimates.

In some London tubes for legal requirements a fourth rail is installed, but the electrical potential is comparatively near to that of the running rails, so that to touch this fourth rail involves small risk of electric shock, unless the person has an unusually weak heart. In one instance an employee got a shock from a sheet of iron lying on wet ground, which, on test, showed 20 volts to "earth." He anticipates that the Ministry will make rules to prevent the use of a fourth rail at even —600 volts from the running rail in addition to +600 volts on the third rail; because with third and fourth rails there is not room to carry on the work necessary on permanent way, and it could only be a menace to the lives of all who come near.

TABLE II—1922 COMPARATIVE ESTIMATES OF CAPITAL COSTS OF ELECTRIFICATION OF SUBURBAN RAILWAY (Details Above)

Voltage collected, volts	600	1,500
Power house	$30,000	$30,000
Cables and substations	25,000	12,500
Trackwork	15,000	37,500
Rolling-stock and electrical equipment	75,000	80,000
	$145,000	$160,000

Prices are stated here in dollars per single track-mile.

Dealing with the Advisory Committee's report, he insisted that it is necessary to apply the tests of practicability and safety and economy to this committee's advice. He found no evidence in its report that consideration was given to the necessity for protecting employees and public from unnecessary risks to life from 1,500-volt conductors near the ground. Neither did he find any evidence that those officials of the Ministry of Transport whose duties include caring for the safety of the public were called before this Advisory Committee in reference to third and fourth rails. They dealt with overhead conductors only. There was no evidence that the committee considered in detail what is involved in its statement that 1,500 volts *or a multiple of 1,500* should be permitted on a third rail.

A three-wire system formerly existed in the two parallel tunnels of the City & South London Railway, where each tunnel had a separate 500-volt system with a total of 1,000 volts. The two were separated by such a distance that no one could get a 1,000-volt electric shock. It seems extraordinary that the committee agreed to a multiple of 1,500 volts on a third rail without limiting the multiple. It is fortunate that the Ministry, by publishing the report, did not sanction anything so liable to cause unnecessary deaths as is inseparable from a high voltage in a rail near the ground within easy reach of any one.

NO ADVANTAGE IN COST GAINED FROM USE OF HIGH VOLTAGE

Mr. Stevens stated further that carefully prepared estimates for 600-volt and for a multiple of 1,500-volt construction, based on details of British suburban service, show that there is no advantage in cost of the higher-voltage system, and that whatever is spent on rendering protection to life by guarding third or fourth rail from contact adds further to the disadvantage in capital cost and in maintenance cost of the higher voltage. The lecturer used data given in Mr. Gibbs' report to the International Railway Association as a basis for some calculations. The Long Island Railroad, said Mr. Gibbs, is "an example of electrification, of a compact network of lines none of which extends more than 30 miles; therefore current distribution can be made economically by a low-voltage system. This fact, Mr. Stevens said, renders the engineering details available for comparison with British conditions.

Hints on Engineering Field Work

The Purpose of Field Work on an Electric Railway—The Kind of Surveys Made—Helpful Apparatus—Suggestions as to the Solution of Special Problems

BY JOSEPH E. RAPUANO
Maintenance of Way Department, the Connecticut Company, New Haven, Conn.

BEFORE discussing the methods of field engineering, let us first understand clearly the uses of the information obtained. Broadly speaking, these are two in number. The first is to provide the field data which the designing engineer requires to design and execute the proposed work and to estimate its probable cost. The second is to convey the designer's views to those in charge of construction. The first of these requirements is covered by the surveys, investigations and inspections preliminary to the design, and the second, by the staking out of the work and its inspection during construction. Both of these requirements can best be fulfilled by a thorough co-operation of all parties concerned in the proposed work.

Undertakings of the kind under consideration on an electric railway may be divided into two groups. The first includes extensions, additional second track, track to be abandoned, new spurs, and renewals which necessitate either a relocation of the present track or a change in the method and manner of construction. Permission to carry out work of this kind must generally be secured from the municipal or state authorities having jurisdiction over such improvements, and, in addition, the Public Service Commission must approve the method and manner of performing the work.

The second group includes renewals or straight maintenance, where the contemplated work necessitates no change in the method and manner of construction. The field information for this second group of topics is generally of use only to the engineer in charge, who must make request for a proper appropriation to cover the probable cost of the work and, in addition, make requisition for the needed material.

When making a survey for work of the first group, which is generally drawn to a scale of 1 in. equals 40 ft., the engineer in charge should locate all underground, surface and overhead obstructions which may require removal or shifting, as well as all curb lines, traveled way lines and street lines. When possible, also, where poles to carry feed wires or overhead trolley wires are to be erected, he should locate all existing poles, whether company owned or not; all property division lines, which in most cases make ideal locations for pole settings, and all driveways and so prevent absurd pole locations. An approximate magnetic north should also be shown on all plans which are presented to the authorities.

As a base line for the surveys just mentioned and those that follow, the general practice is to use the gage line of one of the rails where available and locate as many details as possible by means of offsets from this line. When no rail is available, as in the case of new work, the curb lines or an offset line from the street line will answer the purpose. The important item to bear in mind is that the method best adapted for each particular case is the one that will least interfere with car operation and at the same time produce satisfactory results. Usually the engineer will find it desirable so to plan his work that the required data will be obtained in the early hours of the morning so as not to interfere to any extent with car operation, and at the same time avoid the general traffic congestion later in the day which is sure to hurry his measurements and try his patience.

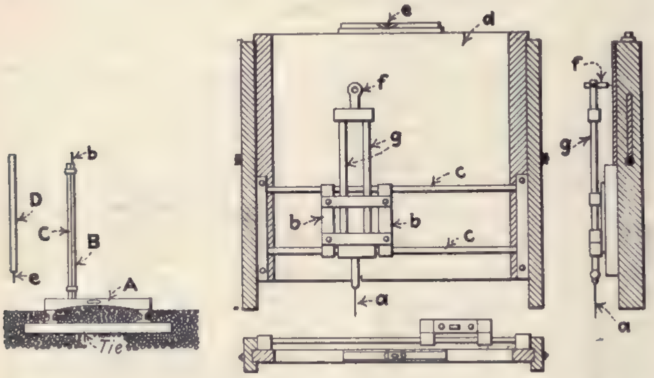
SURVEYS FOR SPECIAL TRACKWORK

In making a survey for a proposed installation of special trackwork the engineer in charge should follow the same precautions except that, in addition, measurements should be taken with a view toward the preparation of a map with a scale of 1 in. equals 10 ft. or 5 ft., depending upon the size and nature of the proposed layout. Wherever traffic conditions make it practical, gage-line intersections are obtained and a direct intersection angle is read. It also makes for better results to locate as many details as possible from this same intersection angle point. Offset lines are sometimes run out when gage line intersections are practically out of consideration, but the results are obviously indirect and the chances for error are multiplied by the greater number of operations to be performed to arrive at the result. Where there is any question of a cut back of a curb at any corner to allow for proper car clearance, the curb should be located with care so that the proper amount of cut back may be determined. In a survey of this kind the section of the rail to abut the special work should also be noted, together with its joint drilling, as this will determine the proper connections. Most railway companies specify that the steel companies shall not only furnish the trackwork but also be responsible for its proper fitting in the ground. When this specification is included, the steel companies in nearly all cases send an engineering representative to check the survey before building the work, so that chances for error may be eliminated. Where possible, all gage-line intersections and other important points obtained during the course of the survey should be referenced, preferably to a pair of existing joints in the rail. This precaution obviously will not only enable one to locate further details at a later date, and with much less loss in time, but it will also expedite the staking out of the proposed work, and moreover will prove of value in case the steel company should find a discrepancy in the angle turned.

Another form of survey that the maintenance of way engineer is often called upon to handle is the survey for evidence to be offered in court cases, including the settlement of accident cases in which the railway company is a party. Here the engineer must not only locate such details and compile such information as will satisfy his own technical viewpoint, but he must also follow the wishes of the company's legal representatives as to their estimate of the relative importance of the details to be secured. If this field information is thus obtained, satisfying both the technical and legal aspects, the engineer on the stand may have a fair chance of escaping the irony aimed at him by the opposition in an effort to discredit his testimony.

SURVEYS FOR SMALL BRIDGES AND CULVERTS

When the design, construction and maintenance of small bridges and culverts are handled by the way department directly, all engineering data and information concerning the work must of necessity be obtained by its engineers. Except for new work, where details of the subsoil, soundings and other special data must be procured, most of the field work will consist of inspections to determine deterioration, wear and serviceability, due to time, weather, and change in rolling stock. By means of these periodical inspections and consequent maintenance, these structures can be kept in serviceable shape from year to year until their complete renewal is advisable. In connection with overhead obstructions on bridges and elsewhere, it is possible for the way department, by means of the apparatus shown just above at the left, to make a record of the shortest distance from the rail level to the wire, wire trough and lowest part of the bridge structure. This apparatus consists of a dry wood board, *A*, made to fit the two rail heads and the crown of the pavement, and a wooden rod, *B-C*, graduated to read up to 14 ft. or more. The auxiliary wooden rod *D* is added to *B* by inserting the cylindrical end *e* in a recess provided in the cylindrical end *b* of the main rod, thus enabling one to measure beyond the reach of the main rod. The record of these measurements thus obtained can be kept up to date by remeasurements as the occasion demands and so become a source of valuable information for all concerned.



AT LEFT, A SIMPLE DEVICE FOR MEASURING THE HEIGHT OF OVERHEAD OBSTRUCTIONS. AT RIGHT, DEVICE FOR DETERMINING RAIL AND WHEEL CONTOURS

It will often be the case that the way department must make periodical investigations concerning the wear of the rails and car wheels, and when this work is properly carried out the results prove of special interest in the case of future renewals. A home-made apparatus for obtaining rail and car-wheel scribings, designed by Albert L. Donnelly, division engineer, the Connecticut Company, is here shown in the second drawing and can be made in almost any company workshop. The accuracy of the readings obtained depend entirely upon the care taken in using this device. As shown, it consists of a metallic needle, *a*, mounted upon a carriage, *b-b*, which can move upon the metallic slides *c-c*, which in turn are secured to the wooden frame *d*. One end of this frame is equipped with a level tube, *e*. The paper upon which the scribing is to be outlined is tacked upon the wooden frame underneath the pencil *f*. In operating the instrument the needle is carefully made to pass over the surface to be outlined by a slight pressure upon the needle which is guided by the hand of the operator. As the needle passes over the surface of the rail or wheel, its horizontal motion is governed by the carriage sliding on the metallic slides *c-c* while its vertical motion is controlled by the rods *g-g*, which slide through holes in the carriage *b-b*. At the same time the pencil *f* records the outline in full size and the operation is complete.

CONSTRUCTION PROBLEMS

Let us now turn to the construction of track layouts. The approval to begin once obtained, the field engineer must plan on the staking out of the necessary line and grade information. Whenever possible this staking out should be done immediately after the approval is received, and at any rate before the street is torn up, to insure a saving in time and thus reduce the cost of the engineering. Unfortunately, due sometimes to simultaneous starts on various jobs and a small engineering force, this ideal procedure cannot always be followed, so the best use must be made of the conditions as they exist. An inspection of each situation will determine the most desirable method of staking out this construction information. On new work, when the track trench has already been dug from approximate data, center line stakes can usually be relied upon to furnish enough guidance for the construction foreman. These stakes may now and then be knocked out by careless workmen, but in the long run good foremen have no difficulty in keeping them if they are set firmly. These stakes are generally set 50 ft. apart on straight track and along radius curves, and sometimes closer on sharper curves and wherever the same stakes are used for both line and grade and the grade calls for shorter stations. The general procedure, however, is to set points on an offset line, preferably from the gage line, so that they will not be disturbed during the grading and trackwork.

These points are set either on stakes where the soil admits, or on regular track spikes driven where the ground is solid enough to prevent the use of wooden stakes. When a concrete foundation will not permit the ready entry of a regular track spike it is customary to use a short spike, only long enough to pierce the wearing surface of the pavement and perhaps just start into the foundation. Now and then points must be set in either a brick, concrete or similar hard pavement which will not permit the entry of any spike. In this case holes can be center punched and colored in the pavement, in which case the staking out should be done as nearly as possible to the time of its actual use by the construction crew, in order to prevent the points being lost. In every case the points should be stationed or numbered and chalked up on the curbs opposite or on guide stakes to facilitate the work of locating them by the construction crew.

Still another method of staking out information can be employed but only in the case of a double track where one track is renewed before the other is touched. In this case the dummy rail of the track to be tackled last is stationed off and the back of the rail is chisel marked at these points with the aid of a regular track chisel. The proposed gage line of this rail is then run out and offsets are read from this line to the existing gage line of the present dummy rail, at the various station points chisel marked on the back of the rail.

A line and grade sheet, like that reproduced, is next made out, for the foreman's guidance, showing at each station the offset from the existing gage of this present dummy rail to the gage line of the proposed dummy rail of the track to be done first. This line and grade sheet is employed also when other methods of staking out are used and should contain not only a record of the points staked out but any other information which may be of value to the construction crew.

The method just described can best be employed where car operation is either infrequent or can be interfered with without impairing the maintenance of time schedules. The disadvantage of this method, from the standpoint of the track foreman, is in the use of the many varying offsets which generally necessitate his constant individual attention, whereas the use of a simple and constant offset would permit him, with greater security, to intrust the work to the sub-foremen and their understudies.

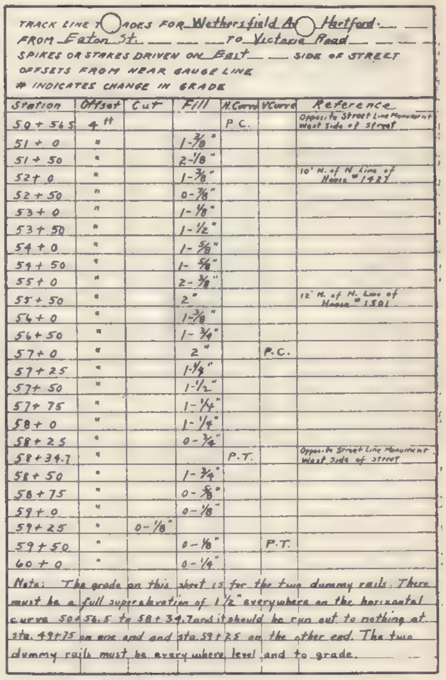
In giving line on a long tangent it is always well to double reverse the instrument and choose transit stations so that they fall at intersections of grades, in order to please the eye if there should be slight swings in the line as a result of instrument work. Considering the short length of the general run of street railway curves the method of offsets from the tangent is much used in running out curves and proves of great advantage in saving time. It is much preferable to the method of deflection angles which require more instrument work and constant annoyance to car operation. When final grades are run out in city work, great care must be used in city work and the construction crew instructed to work to the nearest quarter of an inch so as to get proper results.

STAKING OUT SPECIAL TRACKWORK REQUIRES ADAPTABILITY TO CONDITIONS

The staking out described relates to straight track and flat curves, and its execution furnishes ample opportunity for the engineer to show his ingenuity and discretion. The staking out of special trackwork is another problem and often is trying, because the work often has to be done under traffic congestion and the precision required in the measurements is greater. If the trackwork, however, has been correctly built at the mills, and no error has been made in the field data furnished to the steel company, its staking out should cause no undue worry. Up to recently some steel companies were furnishing this staking out information on an offset line from the gage line, but this practice has given way, generally, to the more efficient method of giving data on the actual gage lines. This latter method has the double advantage of enabling the engineer to see directly how the work fits on the tangents and also permits of points being set on any offset from the gage line. The number of points given are generally enough to insure a ready fitting of the parts, and yet not too numerous to cause confusion. Another important item in staking out special trackwork is to show the construction crew where to cut the old work to insure a proper fit of the new work. Information for cutting the old work is given on the steel company's plans on both ends of the new work. It is well, however, to give the construction foreman cuts on one end only and allow him to work out the cuts on the other end while fitting the work. This precaution is taken for the simple reason that sometimes the new work has been built too short at the mills and would thus necessitate the use of "dutchmen" or short pieces of rail to close the gap if both ends of the old work were cut simultaneously.

CLOSE SUPERVISION IS NECESSARY TO SECURE GOOD RESULTS

The supervision of all track and paving work by competent inspectors is another necessary means of securing desired results. All ties and rails should be inspected and either accepted or rejected before being sent on the job in order to eliminate unnecessary transportation charges. Where trackwork is done by the company forces the roadmaster and his assistants should be given full responsibility for the proper execution of the work. Where, however, as quite often is the case, trackwork is let out on contract, it is quite necessary to supervise the work and for this purpose the company inspector must be well grounded in the essentials of good track construction. He is the means of keeping the department in touch with the daily and weekly progress of the work and becomes the actual mouthpiece of the department in the interpretation of all the specifications affecting it. He should see that all paving is done according to agreement and should at all times bear in mind that the results will represent the efforts of his vigilance during the progress of the work.



TRACK LINE T ADES FOR Wethersfield A Hartford
FROM Eaton St. TO Victoria Road
SPIKES OR STAKES DRIVEN ON East SIDE OF STREET
OFFSETS FROM NEAR GAUGE LINE
# INDICATES CHANGE IN GRADE

Station	Offset	Cut	Fill	H.Curve	V.Curve	Reference
50 + 56.5	4"			P.C.		Opposite Street Line Monument West Side of Street
51 + 0	"		1-3/8"			
51 + 50	"		2-1/8"			
52 + 0	"		1-3/8"			10' N. of N. Line of House # 1427
52 + 50	"		0-7/8"			
53 + 0	"		1-1/8"			
53 + 50	"		1-1/2"			
54 + 0	"		1-5/8"			
54 + 50	"		1-5/8"			
55 + 0	"		2-3/8"			
55 + 50	"		2"			12' N. of N. Line of House # 1501
56 + 0	"		1-3/8"			
56 + 50	"		1-3/4"			
57 + 0	"		2"		P.C.	
57 + 25	"		1-1/4"			
57 + 50	"		1-1/2"			
57 + 75	"		1-1/4"			
58 + 0	"		1-1/4"			
58 + 25	"		0-3/4"			
58 + 34.7	"			P.T.		Opposite Street Line Monument West Side of Street
58 + 50	"		1-3/4"			
58 + 75	"		0-5/8"			
59 + 0	"		0-1/8"			
59 + 25	"	0-1/8"				
59 + 50	"		0-1/8"		P.T.	
60 + 0	"		0-1/4"			

Note: The grade on this sheet is for the two dummy rails. There must be a full superelevation of 1/2" everywhere on the horizontal curve 50+56.5 to 58+34.7 and it should be run out to nothing at sta. 49+75 on one end and sta. 59+25 on the other end. The two dummy rails must be everywhere level and to grade.

LINE AND GRADE SHEET

Upon completion of the work, the public service commission in authority will generally make an inspection of the installation and report as to its acceptance for the state. The company should then measure the work to determine any increase or decrease in the length of the track due to the new construction and record the same in the company track mileage book, showing the total length of track which is owned and operated by the railway.

In conclusion it might be well to emphasize the necessity for ever keeping in mind the scope of all efficient field data which are to serve at all times as a proper guide to the finished work. There is no set rule as to the proper method for obtaining or furnishing this information, for circumstances alone, and the ability of the engineer to meet them, will be the deciding factor in each case. It is sufficient to remark that the methods here outlined will form a base line for the acquisition of others which no doubt will follow with proper effort and experience.

Traffic Survey in New Orleans

An Extended Survey Is Being Made of Traffic on Electric Railway Lines—Difficulties Encountered by Topographical and Other Conditions

A TRAFFIC survey of the New Orleans electric railway lines is being made for the city department of public utilities by the Beeler organization. Its purpose is to determine what improvements should be made in routing and service under the new settlement between company and city.

The peculiar layout of the city makes the routing of cars difficult. The principal streets are laid out parallel to the Mississippi River or perpendicular to it. Since the river turns a full 180 deg. and then reverses itself, it is evident that conditions are unique. The city was not all laid out at one time but is made up of numerous subdivisions whose streets do not always meet, so that many detours from a direct route must be made.

At present there is little or no crosstown service, certain direct lines being turned at right angles so that they provide, in a measure, for patrons desiring to ride across the ruling traffic routes. There is now but one through route passing entirely through the business district, and that route is not at all balanced as to traffic. It is expected that the crosstown service can be materially bettered.

The transfer situation is largely in a chaotic condition. An investigation is being made to see if, with the inauguration of an improved routing, the transfer system can be simplified. This should make it easier for the rider to reach his destination and at the same time reduce the abuse. At present the known abuse of transfers is a matter of serious concern to the operating officials.

New Orleans is not densely built up as is New York and most other large Eastern cities. A great majority of the population live in detached or semi-detached bungalows or two-story houses, making the residence sections cover a large area. It is possible that express service can be installed on certain lines to give better and faster service to the outlying territory. In the business section, which has many narrow and congested streets methods used for relief of congestion, will probably be practicable.

CITY'S RAPID GROWTH A FACTOR IN DETERMINING FUTURE REQUIREMENTS

The second phase of the survey deals with changes in the system to care for the future. New Orleans is growing rapidly and is now the second largest seaport in the United States. Plans will have to be made to provide for new lines as needed to serve the sections which are now developing.

Any rerouting plan will have to take into consideration conditions which are entirely outside of matters of operation. When New Orleans was still a comparatively small town, consisting of two fairly densely settled residential districts, with one business district serving as the connecting link, there were some six separate companies operating under independent franchises. Each company naturally tried to tap the most densely populated portions of the city. A congestion of tracks in these sections resulted, with routes laid out with no consideration except for competition to secure the maximum business for each company. In the worst section this had resulted in sixteen parallel tracks on fifteen adjacent streets.

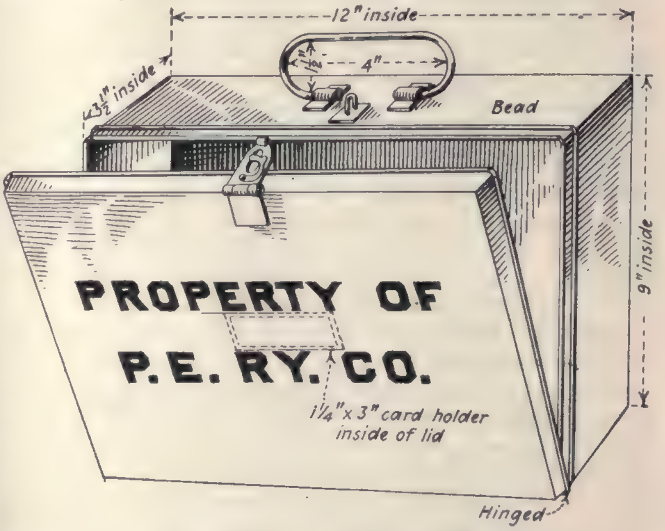
Normally it would not be difficult to correct this feature. In this instance, however, the terms of the indefinite franchise just adopted, under which the new company must operate, specify that not only must the usual paving of tracks be installed and maintained, but once having occupied a street the company is forced to maintain that paving so long as the franchise runs, regardless of whether the track is in active use, is discontinued, or is actually torn out. With this condition, any new track construction means added paving expenses, while abandonment or tearing up of poorly located or useless track gives no compensating relief from this heavy burden.

Conductor's Ticket Container Used by Pacific Electric Railway

READY FOR SERVICE

WHEN a conductor enters the service of the Pacific Electric Railway he is furnished with a supply of tickets, transfers, trip sheets, time cards, ticket envelopes, passenger report blanks, hat checks, cash fare receipts, witness cards, monthly report blanks, accident report blanks, passenger tariffs, miscellaneous report blanks and lost article cards he carries with him.

To protect this property from loss through theft, the company has recently standardized the practice for handling these supplies. All are provided with a metal conductor's ticket container. The container is made of black japanned metal, durable in construction and efficiently designed. The size is large enough to hold the necessary supplies and still is not so large that it cannot be put into locker on cars. The new metal container is plainly stamped "Property of the P. E. Ry." on the side, and enables the conductor properly to care for tickets, etc., issued to him in the safest, most convenient and efficient manner.



CONDUCTOR'S TICKET CONTAINER

Lightning Arresters for Chilean State Railways

LIGHTNING arresters of unusually high voltage have been built by the Westinghouse Electric & Manufacturing Company for the 3,000-volt electrification of the Chilean State Railways. They are designed to withstand the vibration and shock of railway service and are of the electrolytic type.

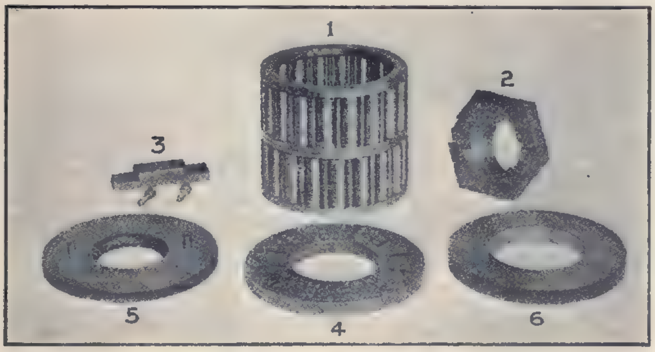
The working parts consist of twelve electrolytic cells with their balancing resistors and an expulsion fuse. The fuse is mounted on the door of the case so that the opening of the door opens the circuit. The fuse chamber at the left is lined with asbestos lumber and is provided with a chute at the top, which extends out of the operating chamber of the engine cab.

The electrolytic cells are held in place on a felt pad by a jar holder with two cells as a unit. Each unit is held in place by a stud projecting from the back of the case and this construction prevents the jars from breaking and makes them easily removable.

The cell is shunted by a resistor to make certain that the voltage is equally divided among them. The resistors are mounted on the micarta panel that serves as the terminal board. The hinge bracing on the case prevents the heavy door from sagging when open, and a strap is supplied at the bottom to carry the weight of the door when closed.

Roller Bearings for Car Journals Receive Severe Service Test

THE accompanying illustration shows the various parts of the Stafford roller bearing which has been given a test by the Michigan Central Railroad for the past year and a half in freight service. This design of roller bearing is now being manufactured for electric railway service by the Stafford Roller Bearing Car Truck Corporation, Lawton, Mich. Besides the set of rollers and frames, this type of bearing has six parts; the bearing unit, adjusting nut, adjusting nut lock and screws, thrust bearing and thrust bearing inner and outer plates. One of the principal features claimed for the design is the use of staggered rollers mounted in a double-squirrel cage to provide a continuous supporting surface, regardless of the sway or set of the axle. For a 5-in. x 9-in. journal thirty-six rollers in two sets of eighteen each are used. The rollers are of oil-treated chrome steel ¾ in. diameter and 2½ in. long.

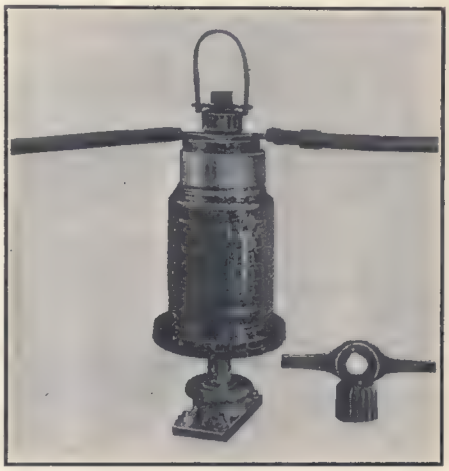


ROLLER BEARING UNITS
(1) Roller bearing. (2) Adjusting nut. (3) Adjusting nut lock and screws. (4) Thrust bearings. (5) Thrust bearing inner plate. (6) Thrust bearing outer plate.

In the test conducted by the Michigan Central Railroad, trucks equipped with this type of bearing were installed under a flat car used in logging service. After operating 2,806 miles the trucks were transferred to a gondola car used in sand and gravel service and run 990 miles, when they were again placed under a box car and used in mixed train service for 3,654 miles. The entire service mileage for the test was 8,375 miles. During this period no trouble was experienced with the bearings, nor were any repairs necessary.

Commutator Repairing Facilitated by Device for Holding Armature from Turning

A CONVENIENT device for holding an armature from turning while the cummutator nut is being removed or tightened is in use in the Kenmore Shops of the Northern Ohio Traction & Light Company. The device consists of an old car center bearing which has been bolted to the concrete floor and into which a keyway has been cut. A scrapped pinion turned down to sufficient size is dropped into the center bearing and a key is slipped between the pinion teeth and the key seat in the center bearing. Another key is dropped in between the armature shaft and the pinion, and the armature is then in a position to resist any turning effort. Using this device, sections of the commutator can be removed with less trouble than if the armature were lying horizontally.



A HOME-MADE DEVICE FOR HOLDING AN ARMATURE WHILE COMMUTATOR REPAIRS ARE BEING MADE

In connection with this device, there is also used another old pinion which has been tapped and fitted with a setscrew. It is attached to the commutator end of the armature shaft and serves both to hold the spanner from slipping while the nut is being tightened and also to hold a loop to which the crane hook is attached during the handling of the armature.

Temperature for Preheating Cast Iron and Steel

IN ORDER to compensate for the lower melting point of cast iron as compared with steel, the Metal & Thermit Corporation, New York, N. Y., recommends that in preheating cast-iron sections, preparatory to thermit welding, these sections be heated only a little more than necessary to show color, such as a dull red heat. This will result in a quieter pour, the fusion will be just as perfect and no hairline cracks will appear. Probably this is because the expansion curve is much greater up to a red heat than it is from the red heat to the white heat and that the sections are, therefore, practically fully expanded at this dull red heat. It is also true that the thermit steel at first heats and expands the sections with which it comes in contact and, therefore, the slight difference in preheating is negligible.

System for Proper Brake Maintenance Pays*

How Accidents and Delays that Are Due to Brake Failures Have Been Practically Eliminated by a Comprehensive Inspection and Maintenance System

By O. R. HILL
Master Mechanic Rockford & Interurban Traction Company,
Rockford, Ill.

MUCH can be done toward preventing accidents, maintaining schedules, and reducing the expense of removing cars from service by having brakes in good operating condition at all times. On our property we have given the subject of brake maintenance considerable attention, and have been amply repaid by a great reduction in the number of cars removed from service for bad brakes and the almost total elimination of accidents and delays due to brake failures. We have not made any radical changes of any kind but have inaugurated a regular inspection system, which we follow closely, and we have insisted that the men whose duty it is to inspect and maintain our brakes do a thorough job. It has been our desire to have them use the right part in the right place at all times.

Beginning where the air system has its connection with the brake rigging we have the brake cylinder. This piece of apparatus requires very little attention and gives very little trouble. It should be thoroughly cleaned and lubricated at least once every six months, at which time any defective or worn parts should be replaced. On our property we use a composition piston packing cup which requires no expander ring and requires only enough lubricant to keep the cylinder walls from rusting. We have had better success with this cup than with the leather ones. The piston sleeve should be lubricated with a small amount of grease at each inspection period. The brake cylinder should be securely anchored to the car underframe so that it cannot move when the brakes are applied. Whenever possible we have lowered our cylinders by using hangers so that the body levers lie in the same plane with the radius bars on the trucks. The forces in the pull rods and body levers are then in line and do not have a tendency to buckle the levers or to pull the car body down on the trucks.

Practically all of our cars are equipped with air brakes for regular service but have hand brakes for emergency use. We have had trouble trying to keep these hand brakes in operating condition. We have taken hand brakes from cars being overhauled in the shop that were rusted so tightly that it was necessary to heat them to remove the staff. This condition has been helped by lubricating the staff where it passes through the floor, at each inspection period, with penetrating oil such as is used in many garages for removing bolts that are stuck. I believe that the proper way to keep a hand brake of this type in operating condition is to require the motorman to make at least one stop each day with it. We now have a number of our cars equipped with the staffless type of hand brake. This brake has been very satisfactory, as it eliminates the point of greatest trouble with the older type of brake, which is the point where the staff passes through the floor.

Body levers should be of the proper size to withstand the heavy stresses placed upon them, should be of the proper length and have the holes properly spaced. They should be supported by substantial hangers. We use a hanger to the top of which is bolted a 1-in. maple strip upon which the body levers rest and upon which they slide when the brakes are operated. A little center plate grease is applied to this maple strip at each inspection period. This strip has quite a long life and is easily renewed when worn. We have part of our body lever hangers much more heavily constructed and securely anchored than would be necessary to carry the levers. This is done to enable them successfully to withstand the shock of the lever striking the safety stop in case of a broken brake rod. There are two of these safety stops attached to the hanger in such a way that should either brake rod fail, the body lever to which it is attached will strike its stop before the piston travels the length of the cylinder and thus permit the car being brought to a stop by the brakes on the truck to which the good pull rod extends. On a property like our own where a large number of different types of cars and trucks are in service, it is very convenient to have the different levers, brake rods, hangers, etc., charted so that they may be easily identified by repairmen whose duty it is to renew these parts at the inspection carhouses. Body levers should be arranged at such an angle that they will stand as nearly perpendicular to the center line of the car as possible when the brakes are applied.

PULL RODS SHOULD BE MADE OF HIGH-GRADE MATERIAL

The pull rods are very important parts of the brake rigging because of the fact that their failure frequently means a serious accident. Although we now use ordinary mild steel for pull rods on our property and have had no trouble with it, still I believe that they should be made of a better material. Some kind of iron similar to Norway iron which will bend rather than snap off should be used for these important parts. The point where the jaws are welded to the pull rod is frequently a place for trouble due to failure of the weld. A number of roads eliminate this point of possible trouble by using a pull rod made of flat material with the jaws either bolted or riveted on, thus doing away with the welds. I have had very little experience with this type of rod but it looks like a good scheme. Some roads give their pull rods a tension test in a machine in the shop before they are installed on the car. I understand that one of the large electric railways in the East tests its brake rigging by applying the brakes with the air pressure 50 per cent above standard and by hammering the rods with a light sledge.

On trucks equipped with the so-called "circle bars" trouble is usually experienced from the roller in the pull-rod jaw wearing a notch in the center of the bar and then catching in this notch and setting up the brakes when rounding sharp curves. On our property we use a double-plate arrangement similar to the trolley used on some light conveyor systems, the pull rod being attached at one end by a pin while the other end carries two rollers, spaced about 8 in. apart, which bear on the circle bar. This arrangement has done away with all trouble from brakes sticking in curves and from notches being worn in circle bars. Circle bars should be lubricated at each inspection period with center plate grease or some similar grease which adheres well to the bar.

Brake release springs should be kept in good condition at all times so that the brake rigging will return promptly to the full release position and not have a tendency to drag. They should be kept tight so that they will not rattle and wear the eyes so quickly. Truck levers should be of proper dimensions and have holes correctly spaced. Care should be exercised by repairmen when changing levers to see that the proper ones are put in. This applies particularly to a property like our own where there are a number of different trucks in service which have similar brake levers and hangers. This is another instance of where the charting of brake rigging parts is a great advantage.

Brake hangers should be renewed before their holes show much wear. A set of badly worn brake hangers will cause the brakes to grab and chatter when applied, making a very disagreeable stop. This chattering accelerates the wear and will finally cause the failure of some part of the brake suspension if not corrected.

Turnbuckles become worn and loose quite rapidly and require constant attention, as a broken turnbuckle may easily cause a serious derailment. When they are badly worn there is also the liability of threads stripping when the brakes are applied resulting in a great loss of braking power. Turnbuckles should have their threads lubricated so that they can be easily adjusted and should be equipped with locknuts or some other device to prevent the adjustment changing while the car is in service. Automatic slack adjusters have come into quite general use in place of turnbuckles and are quite successful in maintaining a constant piston travel.

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*Paper presented before railway section of Wisconsin Utilities Association, Green Bay, Wis., Aug. 17-18.

Shoe heads are subject to much wear and should receive considerable attention from inspectors and repairmen. A shoe head which is badly worn so that the shoe is not properly held in line with the wheel is a source of much annoyance and expense. It wears the shoe unevenly so that it must be removed and scrapped before full wear has been obtained. The two prongs at each end of the shoe head receive considerable wear and are sometimes damaged by the wheel cutting through a shoe which has been left on too long. We are now using a shoe having a straight lug across each end, which makes it very easy to reclaim heads with worn ends by simply cutting a seat on each prong and welding in a small piece of flat steel extending entirely across the head. On trucks equipped with brake beams it is very important that the shoe heads be kept securely attached to the beams at all times. If they are allowed to become loose, the bolts, holes and surfaces of the beam and head will become badly worn in a very short time.

Brakeshoes should fit the heads closely, any burrs or lumps on the shoes which would prevent a good fit being removed before the shoes are put on. Keys of the proper size and curve should be used and care should be exercised to see that the key is properly entered through the lug on the shoe.

HARDENED BUSHINGS, PINS AND BOLTS REDUCE TROUBLES

Wherever possible holes for brake pins, hanger bolts, etc., should be fitted with hardened bushings and the pins and bolts themselves should be hardened. Brake rigging so equipped will remain in good condition very much longer than if hardened pins and bushings are not used. The bushings should be a good driving fit in the hole which is to receive them, should be of the proper length so that they do not project above the surface of the piece after they have been driven home, and should have the sharp inside corner slightly chamfered. Hardened pins should have the cotter-pin hole drilled so that there is a little space between the cotter and the lever or jaw. The edges of this cotter-pin hole should be slightly chamfered to prevent the cutting of the pins. The end of the pin should have a short taper to make it easier to insert without having the holes lined up exactly and without danger of driving out the bushings. At present we are using a forged and hardened pin, but we favor the machined pin as it is more uniform in diameter and has a better finish. We have been bushing practically all holes in our brake rigging and using hardened pins on all trucks overhauled during the last one and one-half years and have noticed a very marked improvement in the general condition of the brakes on our cars.

The proper adjustment of brakes is very important. Most brake inspectors adjust brakes by "feel," that is, they learn to know by the sound when they shake a turnbuckle whether or not it is properly adjusted. This method, however, is not always reliable, and the brake should always be examined while applied and any changes in adjustment made that are found necessary to make the car brake evenly.

One more point which I would like to mention is the matter of the standardization of parts for brake rigging. Of course there are many parts, such as levers, pull rods, hangers, etc., which must be more or less special for the different trucks and types of cars, but with such parts as pins, bushings, shoes, heads, etc., there is a great field for standardization. We now have a change in mind on our property which will eliminate three different brake heads and one type of shoe.

Regulate Service According to Traffic*

A Car Always in Sight Should Be Motto of Electric Railways—Frequent Passenger Counts Necessary to Adjust Service to Traffic

By NELS C. RASMUSSEN
Superintendent Wisconsin Valley Electric Company,
Wausau, Wis.

WE CANNOT expect the schedule which suited traffic ten years ago to be sufficient at this time. It has been my observation that the amount and direction of the traffic is not the same from one year to the next, neither is it the same in one season of the year as in another season of the same year. Formerly we used to have a lot of pleasure riding in the summer time, but the pleasure of automobile riding has taken this business away from the electric railways to a great extent, except in a few instances. Now we must look to the steady passengers to keep up our traffic.

We must lay out our schedules for the rush-hour traffic periods to the best advantage. In some cities if service is frequent enough and distances not too great a good many people go home for their noon luncheon. This kind of traffic should be encouraged as much as possible, as the cars usually are not loaded heavily at that time. The evening rush is usually the time when most street railways are put to the task in handling an enormous amount of one-way traffic in a comparatively short time. That is when usually every available car is pressed into service. On a double-track road, where cars can be readily added to the service, this is not so difficult, but on a small or medium-sized single-track road it becomes quite a problem, as often switches are not so located as to permit the operation of cars between those regularly scheduled. Double heading is often resorted to in this case, but as a rule this does not increase the headway; in fact, it very often slows it up. On our property we were confronted with this problem a couple of years ago, and we had either to double head all of our regular cars during the morning and evening rush hours or decrease the time between the cars. We decided on the latter and shortened our headway five minutes on city lines and ten minutes on suburban lines. To do this it was necessary to move some of our switches in order to establish proper meeting points for the cars. This we did, and the result at that time was very gratifying, as we not only handled traffic better and faster but increased it about 30 per cent.

However, this summer general business conditions in our city have been somewhat depressed and traffic on our lines has slowed up to some extent, and we are now considering cutting one car off during the hours of light traffic. This again will require us to put in another switch on the suburban line, but we believe we can do that, and save a car about six or seven hours per day, so the money spent for installing this switch should bring good returns.

We have also tried other methods, such as shifting a car from one line to the other. We are doing this in the morning for one trip, when we have a large number of workmen going to one of the principal industries on one of our lines. They all come from one general direction on another line, and to avoid transferring we run this car directly through to the industry mentioned, and the car coming in to the transfer point at that time is shifted. This eliminates transferring a carload of passengers and has proved very popular with the patrons using this service.

In a good many instances the laying out of a schedule has been guesswork, especially in former years. I believe a superintendent should check his service every now and then by getting an accurate count of passengers on certain points on the line at certain times of the day. He should then chart the result and compare the number of seats furnished to take care of the traffic shown on the chart, not forgetting that the more frequent service he is giving the more traffic will be built up. I am a firm believer in frequent service, and my motto is "A car in sight at all times."

We must not lose track of the fact that our greatest competitor, the privately owned automobile, is steadily teaching people the riding habit, and when their auto is not available, the street car is their next step, as they will not walk as they used to do in former years.

We have also made other adjustments, such as in the leaving time of cars from the heart of the traffic center. For instance, our suburban cars were leaving the traffic center on the hour, twenty minutes after the hour and forty minutes after the hour, but we discovered in a very short time that the clerks in the stores, and laboring men, who are working, say, until 5 o'clock, could not catch the 5 o'clock car. For those who lived in the city, it did not make much difference, as they were able to catch the 5:10 car, but the suburban passengers had to wait until 5:20. We therefore changed the schedule so that now our suburban cars leave the heart of the traffic center at ten minutes after the hour, thirty minutes after the hour and fifty minutes after the hour, and now all clerks and laboring men who quit at 5 o'clock can catch the 5:10 suburban car. If they live within the city they can be home in fifteen minutes, and if in the suburban territory in thirty minutes after quitting work.

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*Abstract of paper presented before railway section of Wisconsin Utilities Association, Green Bay, Wis., Aug. 17-18.

If it is found to be impossible to speed up the schedule during the light hours of traffic, it might in some instances be possible to turn certain cars back before reaching the end of the line. Care should be taken, however, not to impair the service, and it is much better to run a car a trip or two where it is not needed than to cut off a trip where there is the slightest necessity of operating to the end of the line.

Keep on a'Courtin' that Gal*

Companies Make Grave Mistake to Stop Public Relations Work with Improving Conditions—Homely Analogy of the Public and One's Wife Makes Plain What the Task of Winning Good Will Is

By LABERT ST. CLAIR
Director Advertising Section
American Electric Railway Association, New York City

ONE of the gravest dangers which now confront the industry is that managements, satisfied with their increasing prosperity, will neglect their public relations. The management which now cuts down its advertising and other public relations work is making a costly mistake. The public must be courted continuously in every possible way if its good will is to be reretained.

"But," it is declared, "I don't have to advertise any longer. The crisis is passed. All my people demand now is a good ride. With that they will be thoroughly satisfied."

This argument is as fallacious as the one that all a husband has to do to keep his wife's affections is to feed and clothe her well.

The public and wives are just alike in that they they expect something more than the legal requirements of aid from those who would court their favor. And if they don't get a little extra attention, the first thing the neglectful husband knows along will come Mr. Jitney Bus, or some other stranger with a dyed mustache and many promises, and an elopement will follow. Of course, this stranger won't do half the things he promises, but the wife who is getting scant attention save board and keep is likely to be attracted to him, anyhow.

NEED FOR ADVERTISING NEARLY AS GREAT AS EVER

The public needs to be told the facts about electric railways now through advertising even more than it did when roads were in great financial distress. Unthinking persons, and even some of those who do think, are likely to believe unless the whole situation is explained to them that simultaneously with this prosperity which is just coming over the horizon, rates of fare should go back to where they were before the war. Of course such a procedure, before roads have had an opportunity to readjust themselves, would be ruinous. But how is the average car rider to know this and many other things of great importance to his service, if it is not explained to him?

Tell the public the facts. If things are getting brighter, say so. A smile always is more attractive than a frown. I honestly believe that, down in his heart, the average man and woman wants his electric railway and other public utilities to be prosperous. If they are not prosperous, the town in which they operate cannot be. And no one wants his town to go back. The thing to do, therefore, is to show how general prosperity is dependent upon utility prosperity. And the way to get this fact across to the public is to advertise.

The day for weeping, certainly, is past. You see many persons drop a coin into a crippled hand-organ grinder's cup once, but you seldom hear of any one employing him to play continuously.

GOOD PUBLIC RELATIONS MAN NOT HARD TO FIND

Here and there we still find a few public utility companies which pay no attention to public relations because they say they have no expert in this work to do it for them. This is not a good excuse for neglecting such an impotant feature of our business. Of course, there isn't an advertising expert in every company, but there is always one man who has made a success of married life. Place him in charge of public relations and tell him to apply to the public the plans that he finds works well in dealing with his wife, his children and his neighbors, and your public relations will improve.

In the beginning let him regard his position as that of the street car company and his wife as that of the riding public. Then make him understand that his biggest job is to keep the wife happy. He quickly will recognize these fundamentals.

The husband must bring home the bacon. But that is not enough. He must take his wife into his confidence about how the bacon is procured, what the outlook is for more bacon, and when a few eggs and cake can be expected on the side. The more the wife knows about the details of the getting the more help she will give and the more patient she will be. The bacon is the electric railway ride.

The husband must deliver a few surprise packages along with the bacon. Give the wife just a little more than she expects. It will please her. The weekly pass is a good example of this.

The husband must take pride in keeping his personal appearance apace with that of the rest of the household. The electric railway company which doesn't keep its cars clean is comparable to the husband who sits around the house in his undershirt on Sunday and refuses to shave.

Finally, if a wife's co-operation is expected, her advice must be asked on questions of mutual interest. She may give valuable aid, and even if she doesn't, it will improve relations to give her a chance to help. The electric railway company which does as it likes in all things without consulting its riders is going to have much the same sweet time as the husband who buys his wife's hats without consulting her.

Safety as an Operating Factor*

BY F. R. COATES
President Community Traction Company
Toledo, Ohio.

THE development of accident prevention in industry began several years ago and the result was a marked decline in the number of industrial accidents. At the same time the number of utility accidents, due to public conditions, street and home, was increasing alarmingly. Barnum was right, there is one born every minute. Only he referred to suckers, I refer to fool auto drivers, and of all the hazards we public utility railway men have to contend with, this constitutes the greatest.

The auto deaths in ten American cities, picked at random, show increases in five and decreases only in cities where safety campaigns have been in progress during the past two years:

	1920	1921
New York	756	865
Chicago	542	668
Philadelphia	232	191
Detroit	240	134
St. Louis	102	97
Milwaukee	72	67
Rochester	37	38
Flint, Mich.	52	25
Louisville	18	20
Grand Rapids	16	17

Of the 12,588,949 motor vehicles in use in the world, 83 per cent, or 10,505,666, are in the United States.

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*Abstract of address presented before the banquet of the railway section of Wisconsin Public Utilities Association, Aug. 18, 1922.

*Abstract of paper presented at meeting of the Electric Railway Section, National Safety Council, Detroit, Aug. 28-Sept. 1.

Three times as many persons meet death by automobile accidents as are killed in all the factories, mines, railroads, and other industries. That means 500,000 automobile accidents a year. Every thirty-five minutes that your watch ticks off, records the death of another person due to an auto accident. This is but one phase of the operating officials' troubles as far as accidents are concerned, but it is the most important one and is bothering every one of the operating officials in the country.

Safety as an operating factor must be reckoned with. A few years ago operating heads gave scant heed to it until it had been demonstrated most forcibly to them that it was the one thing most needed if accident costs were to be reduced. We find in Toledo that well organized safety work pays and, largely through this channel, we are able to make the following comparisons:

REDUCTION IN ACCIDENT AND LITIGATED CASES HIGHLY GRATIFYING

In eight years or from 1914 to 1921, public accidents were reduced from 3,008 to 2,295 and employee accidents from 306 to 152 for 1921. During the same period the total expenditure for accidents went from $149,225.19 to $69,729.74, the litigated cases from ninety-one to twenty-two and the per cent of accident cost to gross revenue from 7,813 to 2.35. Of this record we are justly proud, but realize that it could not be accomplished unless we enjoyed the hearty co-operation of our employees, due almost entirely to our safety talks to them plus the work done with the public.

The attitude of employers today is greatly different from that maintained ten or fifteen years ago. There are many employers today who are willing to consider the question largely from its humanitarian standpoint alone. The number of these men is increasing daily, but there still remains a large aggregate of employers who must be approached through their pockets rather than through their hearts.

The operator and the manufacturer have learned the lesson that safety methods pay:

First, because they are the means of saving life and limb, not only to the employees but to the public as well; and

Second, because the saving of dollars and cents as a result of the efforts expended returns twofold.

French Lick Convention

THE second annual convention of the Great Lakes Division, National Electric Light Association, will be held at French Lick Springs Hotel, French Lick, Ind., Sept. 27, 28, 29 and 30 in joint session with the fourteenth annual convention of the Indiana Electric Light Association. A very comprehensive and interesting program has been arranged under the direction of Harry Reid, president of the N.E.L.A. Division, and Secretary R. V. Prather.

Union Internationale de Tramways

THE dates of Oct. 2 to Oct. 7, 1922, have been selected for the eighteenth convention of the Union Internationale de Tramways, de Chemins de Fer d'Intérêt Local et de Transports Publics Automobiles. The meeting has received official recognition from the Belgian government, and an attractive social program has been arranged in connection with the meeting. Technical sessions will be held each morning, from Monday to Friday inclusive, and there will be an afternoon technical session on Thursday. A list of the papers follow:

1. "A study on the increase in first cost and in operating expenses of tramways, interurban railways and bus lines, as compared with the period before the war," by A. Mariage, chairman of the board and general manager of the Société des Transports en Commun de la Région Parisienne.
2. "Automatic substations," by L. Sekutowicz, director of the technical service of the "Omnium Lyonnais" at Paris.
3. "Electric welding and other kinds of welding for railway tracks and railway shops," by E. d'Hoop, director of the Brussels Tramways Company.
4. "The financial condition of the Swiss railways from 1913 to 1920," by Charles Rochat, general manager Geneva Electric Railways.
5. "The use of mercury arc rectifiers for tramways," by M. Odermatt, engineer of Brown, Boveri & Company, Baden, Switzerland.
6. "Motor rail cars for interurban lines," by J. de Croes, chief engineer, Société Nationale des Chemins de Fer Vicinaux, Brussels.
7. "Comparison of the different systems for the electrification of interurban lines," by A. Pirard, general manager of the Société Anoyme d'Enterprise Générale de Travaux, Liege.
8. "Motor bus service organization in great cities," by H. E. Blain, assistant managing director London Underground Railways and London General Omnibus Company Group, London.
9. "One-man cars," by P. N. Niewenhuis, manager of the Arnhem Municipal Tramways.
10. "Modern improvement in tramway rolling stock," by C. J. Spencer, general manager London Group of Tramway Companies, London.

This is the first meeting of the association since the war, in fact since a meeting which was scheduled to be held in Budapest in 1914. The official language of this association is French, and that is the language in which the papers and proceedings of the association are published.

American Association News

Large California Delegation Going to Chicago

W. V. HILL reports that the California delegation to the Chicago convention of the American Electric Railway Association will be about twenty-five strong. Arrangements have been made for a special Pullman to take the party to Chicago.

Mr. Hill is now in Washington to confer with Charles L. Henry, the association's representative there in national relations. While it is not now expected that there will be legislation on the present steam railroad strike, the association's representatives are prepared to prove to any congressional committee that the electric railways should be exempted from the provisions of any such bill, just as they were under the Esch-Cummings bill.

Good Will Signs

THE advertising section of the American Electric Railway Association has just brought out five "good will" signs, 14x18 in., printed in colors, relating to the reliability, safety and other advantages of electric cars for urban service. These signs can be used either in car windows or posted around the property of a railway or manufacturer interested in promoting the welfare of electric railways. Member companies can secure copies gratis.

Claims Association Expands Objects

FOR some years the American Electric Railway Claims Association has been handicapped by the statement in its constitution outlining its "objects." This year a determined effort will be made to change the constitution to accord with the present conditions. The clause drafted for the constitution and approval by the executive committee of the Claims Association reads as follows:

> The objects of this association shall be to endeavor through co-operation, study and discussion to ascertain, inaugurate, maintain and develop those modes of procedure, practices, policies and ethics most effective in preventing accidents, determining and discouraging unreasonable claims, minimizing inequitable expenditures and other waste, defending against unfair demands, adjusting claims owed, and otherwise advancing the ultimate best interests of member companies and those they serve.

The clause at present in the constitution, as adopted in 1906 and later amended, reads as follows:

> The objects of this association shall be to bring together those engaged in the claim departments of urban and interurban railways and the electrified sections of steam railways for the interchange of ideas and to promote the mutual protection of such companies from fraudulent claims.

It is thought by the executive committee that under the present constitution no paper can be presented at the convention unless it relates to the foregoing very limited object. Hence the desire for a change.

Tentative Programs of the American and Affiliated Associations

(Corrected by the Association up to Aug. 31, 1922)

American Association

Monday, Oct. 2

Registration, etc.

Tuesday, Oct. 3

10:00 A.M. to 1:00 P.M.

Convention called to order.
President's Address.
Report of Executive Committee.
Report of Executive Secretary.
Report of Treasurer.

Appointment:
- (a) Committee on Resolutions.
- (b) Committee on Recommendations in President's Address.

Committee Reports:
- Constitution and By-Laws—C. L. HENRY, chairman.
- Memberships, Company and Associate—F. R. COATES, chairman.
- Company Section and Individual Members — MARTIN SCHREIBER, chairman.
- Co-operation with State and Sectional Associations—W. H. SAWYER, chairman.
- Finance—J. H. PARDEE, chairman.
- Publicity — J. N. SHANNAHAN, chairman.
- Publications—L. S. STORRS, chairman.
- Co-operation with Manufacturers —E. F. WICKWIRE, chairman.

Address by a prominent industrial executive: "Development of Community Transportation and Its Effect on Other Industries."

Discussion:
- Public Relations—Series of Short Talks; Opening address by VICE-PRESIDENT M. C. BRUSH, American International Corporation, who will introduce the following speakers for five-minute talks:
- H. B. FLOWERS—"Keeping in Touch with Local Organizations."
- MARTIN SCHREIBER — "Results in Southern New Jersey."
- BRITTON I. BUDD—"Use of Company Publications."
- BARRON G. COLLIER — "Utilizing Company Advertising Mediums."
- L. S. STORRS — "Relation of the Public Press to the Traction Problem."
- W. H. SAWYER—"How I Use Paid Newspaper Space."
- J. P. BARNES — "Value of State Publicity and Information Bureaus."
- C. E. MORGAN — "Telling Your Story Through Employees."
- P. S. ARKWRIGHT—"Public Speaking as a Publicity Medium."
- Speaker to be announced later— "The Operation of a Community Committee Plan."

Wednesday, Oct. 4

Committee Reports:
- Nominations.
- Election of Officers.
- Committee of One Hundred—GUY E. TRIPP, chairman.
- Valuation — J. P. BARNES, chairman.

A report dealing with economic procedure for appraisals; with comments on various court decisions and property valuations. "Yard Stick" method of valuation.

Committee Reports:
- Electrolysis—W. J. HARVIE, chairman.
- Policy—BRITTON I. BUDD, chairman.
- National Relations — CHARLES L. HENRY, chairman.
- Mail Pay—L. H. PALMER, chairman.
- Joint Committee of National Utility Associations—RANDAL MORGAN, chairman.
- Education—EDWARD DANA, chairman. A comprehensive report with theses, covering the following phases of educational work:
- Co-operative Courses with Universities and Colleges.
- Similar Co-operation with High Schools and Trade Schools.
- Co-operation with Manufacturers.
- Conducting Classes on University Extension Plan.
- Instruction of Supervisory Forces.
- Company Sections.
- Shop and Departmental Apprentice Courses.
- Distribution of Company and Association Literature.
- Americanization of Foreign Born Employees.
- Instruction in Courtesy to the Public.

Address on a National Topic by a Federal governmental official.

Past-Presidents' Day:
- Short talks by oldest living and other past-presidents of the Association, subject introduced by JOHN M. ROACH, and the meeting to be conducted by PAST-PRESIDENT GEN. GEORGE H. HARRIES.

Thursday, Oct. 5

Committee Reports:
- Trackless Transportation—H. B. FLOWERS, chairman.
- Uniform Motor Vehicle Law—C. D. CASS, chairman.
- Maintenance and Construction of Highways—W. J. HARVIE, chairman.
- Special Taxes—C. D. EMMONS, chairman.
- Resolutions.
- Recommendations in President's Address.
- Address by HON. CARL D. JACKSON, chairman Wisconsin Railroad Commission.
- Address by a well known public official on "Taxation of Public Utilities," to be followed by a discussion by a member of a state public utility commission.
- Paper on some phases of Trackless Transportation.
- Unfinished business.
- Installation of Officers.

Engineering Association

Monday Morning, Oct. 2

Registration.

Monday Afternoon

Convention called to order.
Address of President.
Report of Executive Committee.
Report of Secretary and Treasurer.
Presentation of Past-Presidents' Badges, H. H. ADAMS, Master of Ceremonies.
Safety Address—W. H. BOYCE, general manager Beaver Valley Traction Company, New Brighton, Pa.

Committee Reports:
- Reorganization—F. R. PHILLIPS, chairman.
- Unification of Car Design—H. H. ADAMS, chairman. A study of car design containing valuable data on good practices.
- Heavy Electric Traction—SIDNEY WITHINGTON, chairman. Electrified Mileage and Locomotive Tonnage Data on Electrified Roads, United States and Abroad —Supplement to Bibliography.

Tuesday Afternoon, Oct. 3

JOINT MEETING WITH ACCOUNTANTS' ASSOCIATION

Safety Address.

Report of Joint Engineering-Accounting Committee—CHARLES R. HARTE, chairman (Engineering); H. C. KIMBALL, chairman (Accountants). This report contains a classification code including all items in construction and reconstruction so arranged that Interstate Commerce Commission account numbers may be adhered to. The code is designed so that at any time during progress or after completion of a job, the cost of any item of work may be readily determined.

Committee Reports:
- Equipment—R. H. DALGLEISH, chairman. Wheel Tread and Flange Contours, Helical Gears, Trolley Contact Devices, Review of Existing Standards.
- Buildings and Structures—FRANK H. MILLER, chairman. Design of Typical Shop Building and Layout Design of Small Bridges, Culverts and Trestles, Review of Standards and Recommendations.

Paper—"Related Function of Engineer and Accountant in Public Utility Development," EDWIN D. DREYFUS, engineer West Penn Railways, Pittsburgh, Pa.

Wednesday Afternoon, Oct. 4

Safety Address.

Committee Reports:
- Way Matters—W. F. GRAVES, Chairman.
- Standardization of Frogs and Car Clearance Easements.

Proper Location of Tongue Switches.
Wheel Tread and Flange Contours.
Revision of Girder Rail Specifications.
Design of Substitute Ties.
Welded Rail Joints.
Wood Preservation.
Specifications for Sundry Track Materials.
Dimensions of Frogs Used in Tongue Switches and Split Switches.
Track Construction on Paved Streets.
Review of Standards and Recommendations.

JOINT MEETING WITH AMERICAN WELDING SOCIETY

Paper—"Possibilities of Welding and Need for Research and Standardization"—C. A. McCune, president American Welding Society.
Paper—"Welded Rail Joint Problems"—E. M. T. Ryder, way engineer Third Avenue Railway System, New York City.
Paper—"Application of Welding—Electric, Gas and Thermit—in the Electric Railway Shop."

Thursday Afternoon, Oct. 5

Safety Address.
Committee Reports:
- Power Generation—E. H. Scofield, chairman.
- Advance in Art of Power Generation, Action Toward Joint Study by All Associations Interested.
- Electrolysis; Review of American Committee Report.
- National Electrical Safety Code.
- Automatic Substations.
- Wire and Cable Specifications.
- Power Distribution—M. B. Rosevear, chairman.
- Overhead Wire Crossing Specifications—joint actions of national associations under auspices of A.E.S.C. looking toward formulation of national standard.
- Wire and Cable Specifications.
- Composition and Wear of Trolley Wire.
- Lightning Protection.
- Pole Reclamation.
- Automatic Substations.
- Electrolysis—Review American Committee Report.
- National Electrical Safety Code—Adoption by A.E.S.C. as national standard.
- Wood Preservation.
- Aluminum Wire.
- Review of Standards and Recommendations.
- Purchases and Stores—W. H. Staub, chairman. A study of methods of taking periodical inventories.
- Standards—Martin Schreiber, chairman.

Presentation of 1921 Report of Joint Committee on Stores Accounting for approval of Engineering Association.
Report of Committee on Resolutions.
Report of Committee on Nominations.
Election of Officers.
Installation of Officers.
Adjournment.

The American Bureau of Welding announces that a meeting of the Welded Rail Joint Committee will be held Thursday morning, Oct. 5.

T. & T. Association

Monday Morning, Oct. 2

9:30 a.m. to 12:30 p.m.

Registration, etc.

Monday Afternoon

Convention called to order.
Annual address of President.
Annual report of Executive Committee.
Annual report of Secretary and Treasurer.
Appointment of Convention Committee.
- (a) Resolutions.
- (b) Nominations.

Committee Reports:
- Merchandising Transportation—E. M. Walker, general manager Terre Haute Traction & Light Company, chairman.

A Report on Practical Business Getting:
- Making By-Products Pay.
- Selling Under a Zone System.
- Meeting Bus Competition.
- Increasing Freight Business.
- Getting Auto Owners' Business.
- Selling to Your Employees.
- Making Salesmen of Employees.
- Increasing Interurban Business.
- Selling the Weekly Pass.
- Boat Line Co-ordination.
- The One-Man Safety Car.
- Summer Resort Business.

Discussion led by Edward Hungerford, nationally known writer on railway matters, and followed by E. C. Spring, general superintendent Lehigh Valley Transit Company.

Round table discussion of weekly pass and other forms of reduced rate tickets, led by G. T. Seely, vice-president Pennsylvania-Ohio Electric Company.

Tuesday Afternoon, Oct. 3

Report of Committee on Nominations.
Election of Officers.

Committee Report:
- Traffic Regulations—H. B. Flowers, vice-president and general manager United Railways & Electric Company of Baltimore, chairman.

Address:
- By C. F. Fitzmorris, Chief of Police, Chicago, Ill., on Traffic Conditions and Regulations in Chicago. General Discussion of Report.

Committee Report:
- Safety Work—W. H. Boyce, general manager Beaver Valley Traction Company, chairman.

Discussion:
- J. P. Barnes, president Louisville Railway; H. T. Bell, secretary Chicago Safety Council, and others.

Wednesday Afternoon, Oct. 4

Committee Report:
- One-Man Car Operation—C. E. Morgan, general manager Brooklyn City Railroad, chairman.
- Paper—Lightweight Interurban Cars—J. P. Pope, general manager Kentucky Traction & Terminal Company, Lexington, Ky.

Discussion:
- Paper—Turnstile Cars—J. E. Duffy, general superintendent New York State Railways, Syracuse, N. Y.

Thursday Afternoon, Oct. 5

Committee Reports:
- Personnel and Training—J. E. Wayne, vice-president and assistant general manager York Railways, chairman.
- Discussion. Francis L. Dunhoune, Baltimore, and others.

INTERURBAN HOUR

- In charge of E. C. Spring, general superintendent Lehigh Valley Transit Company.
- Presentation of Past-Presidents' Badges.
  - (President L. H. Palmer will officiate as Master of Ceremonies.)

General Business.
Report of Committee on Resolutions.
Election of Officers.
Installation of Officers.
Adjournment.

Accountants' Association

Monday Afternoon, Oct. 2

President's Address.
Committee Reports.

Tuesday Afternoon, Oct. 3

JOINT MEETING WITH ENGINEERING ASSOCIATION

Report of Joint Engineering-Accounting Committee—Charles R. Harte, chairman (Engineering); H. C. Kimball, chairman (Accountants).

Paper—"Related Function of Engineer and Accountant in Public Utility Development," Edwin D. Dreyfus, engineer West Penn Railways, Pittsburgh, Pa.

Wednesday Afternoon, Oct. 4

Presentation of Past-Presidents' Badges.
Paper—Public Utility Accounting—Walter H. Timm, clerk New Hampshire Public Service Commission, Concord, N. H.
Paper—Budget Control—Harry A. Snow, Detroit Edison Company.

Thursday Afternoon, Oct. 5

Program to be announced.

Claims Association

The details of the program of the Claims Association have not yet been made public. They will be issued soon in a pamphlet by President Cecil G. Rice.

Executive Committee American Electric Railway Association

THE August meeting of the executive committee of the American Electric Railway Association was held in New York on Friday, Aug. 25. Those in attendance were President Todd, Vice-Presidents Emmons, Shannahan and Coates, F. E. Webster, L. H. Palmer, R. P. Stevens, W. H. Sawyer, H. G. Bradlee, John G. Barry and George H. Tontrup, members of the executive committee, Past-Presidents Henry, Stanley, Pardee and Harries, and several chairmen of committees who presented their reports to the executive committee.

The first of these reports to be presented was that of the finance committee. Mr. Pardee said the association now has about $30,000 of unpaid dues of members and that it was most desirable that these dues be collected before the convention. Mr. Welsh reported that he was now making a campaign to collect these unpaid dues. The report of the committee on trackless transportation was then presented by Mr. Flowers and accepted.

Mr. Henry then spoke for the committee on national relations and Mr. Emmons for the committee on subjects and meetings. Mr. Emmons' report is represented by the program printed in this issue. Mr. Shannahan presented the report of the committee on publicity, and Mr. Henry the report of the nominating committee. This report is printed by itself on this page.

Mr. Henry explained in connection with these nominations that the committee had first asked Mr. Budd, who had served as first vice-president this year, to accept the nomination for president next year, but that he had said that his personal and business affairs would not permit him to give the time during the coming year which would be required as president. The committee therefore nominated him again for the office of first vice-president and had nominated Mr. Emmons as president. The nominations were accepted by the executive committee.

Mr. Coates then made a report for the committee on company and associate membership, and said that on Aug. 25 there were 325 railway members, fourteen associate members, and 224 manufacturing members. This is an increase in each group as compared with a year ago. A number of individual members were then elected to the association.

Mr. Welsh reported that up to date 55,500 sq.ft. of exhibit space was sold. This is an increase of about 5,500 sq.ft. over the total of last year. The exhibit committee hopes that the total this year will be about 60,000. Mr. Welsh explained that more than 150 manufacturing companies had already applied for exhibit space, that arrangements have been made for a fare-and-a-half for the round trip to Chicago and that a large attendance was expected at the October convention.

Mr. Welsh then explained about the appointment since the last meeting of the executive committee of Col. John Price Jackson at the recommendation of the joint fuel committee, to act for the three utility associations in Washington in the coal crisis to assist in getting priority for member companies and push through shipments of coal. The appointment was authorized by the executive committee with the proviso that the cost should be limited to $4,000.

M. R. Maltbie of Baltimore was appointed special representative of the Association to the National Traffic Officers' Convention at Atlantic City Sept. 18 to 25, and V. L. Havens of *Ingeniería Internacional* and Calvin W. Rice were appointed to represent the Engineering Association at the International Engineering Congress, to be held at Rio de Janeiro, Brazil.

At the suggestion of Mr. Storrs, the executive committee approved the submission to the members of a slight change in the constitution. The constitution at present requires the executive committee to hold a meeting just before and just after the annual convention and at the time of the mid-year meeting, to hold nine other meetings during the year, and to determine the time and place of these meetings at its first meeting after the convention. The change recommended and approved by the executive committee does not require it to make this selection of time and place for the nine last named meetings at its first meeting.

The request of the Engineering Association for an appropriation of $20,000 to pay for a test of rail joints was considered. The test was considered desirable but an appropriation was deferred until it could be determined that the association had funds available for this purpose. Mr. Palmer reported that Mr. Maltbie of the mail pay committee had found that many replies to the questionnaire sent out by the committee had been filled out very carelessly, indicating that the questions had not been carefully read. In consequence, many of these replies had to be sent back for correction. He urged greater care in the filling out of these blanks.

The committee then adjourned to meet on Monday, Oct. 2, at 10 a.m. at the Drake Hotel, Chicago.

"An Interrupted Operation"

WHEREIN HORTENSE HORSESENSE SAVES THE DAY

OF COURSE you don't know what this title conceals. Neither do any others outside of the actors who will appear in the piece and the author. There are to be seven leading men and they will be helped out by ten babes of the beauty chorus and twenty singers who knock 'em dead. Oh, boy, you are admonished to bring the wife. The reason is that she probably has an idea, judging from you, that there isn't anything clever about a railway man. But now you bring her, for the whole cast of this show is made up of railway men and maidens and it is accredited by the insiders with the prospects of being one of the greatest hits ever manufactured out of anything less than professional material. And after the show there will be dancing. If you're lucky perhaps you'll dance with one of the ten show "babies." Recollections of college days, what? Spunk up. It will only cost you 5 berries, including dinner. And what's 5 berries with such prospects ahead. The place is Marigold Garden, Chicago—fifteen minutes from the Drake Hotel in a "Yellow" or on one of Henry Blair's cars. The Time—Wednesday night, Oct. 4, 6:30 p.m., with no closing hour scheduled. The occasion, the American Electric Railway Association convention. Men and women of the industry are going to prove that not all the sprightly ones are on Broadway or all the stars in Hollywood. Here is the cast of characters:

Ellick Traxion, the Victim.
Prof. The Peepul, M. D., Superintendent.
Dr. Comish } Operating Surgeons
Dr. Labor Borde }
Hon. G. D. Politiks } Visitors
O. Lemme Fixit }
Hortense Horsesense, President of the Society for the Prevention of Cruelty to Utilities.
Miss Dividends—Niece to Traxion.
Nurses, Attendants, Policemen, etc.

Oh, yes, a word about the author. He is John E. Wilkie, vice-president of the Chicago Railways. Mr. Wilkie also wrote the songs. 'Nough said.

Officers Nominated for Next Year

THE nominating committee of the American Electric Railway Association has made the following nominations for officers of the association for the year 1922-23:

President, C. D. Emmons, president United Railways & Electric Company, Baltimore, Md.

First Vice-President, Britton I. Budd, president Metropolitan West Side Elevated Railway, Chicago, Ill.

Second Vice-President, J. N. Shannahan, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

Third Vice-President, Frank R. Coates, president Community Traction Company, Toledo, Ohio.

Fourth Vice-President, W. H. Sawyer, president East St. Louis Railway, East St. Louis, Ill.

Treasurer, Barron Collier, president Barron G. Collier, Inc., New York City.

Four members of the executive committee whose terms will expire in 1925, two to be railway men and two manufacturers:

Paul Shoup, president Pacific Electric Railway, San Francisco, Calif.

James P. Barnes, president Louisville Railway, Louisville, Ky.

H. D. Shute, vice-president Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

C. K. Knickerbocker, vice-president Griffin Wheel Company, Chicago, Ill.

The committee making this report consisted of Charles L. Henry, chairman; George H. Harries, H. B. Flowers, B. A. Hegeman, Jr., E. F. Wickwire, Edward Dana and Horace Lowry.

Recent Happenings in Great Britain

Electric Supply Development—Safety of Passengers—Ballasted Tramway Tracks—Jubilee at Glasgow

(From our British News Representative)

THERE is an expectation that the passing by Parliament of the electricity (supply) act, which received the Royal assent on Aug. 4, will soon lead to a sensible development of the supply and use of electric power for all purposes all over the country. The act is supplementary to one of the same name which was passed in 1919 and which set up a public body called the Electricity Commissioners with wide powers for the development of electricity supply. The country is being divided into electricity districts and joint electricity authorities composed of representatives of various interests are being constituted. These will develop their districts and carry out co-operation and consolidation schemes. The interests of existing undertakers are protected so much that little can be done except by consent. The new act confers a power the want of which was paralyzing the whole scheme, namely, the power to the joint authorities to raise capital by borrowing for the purpose of acquiring generating stations and providing new ones. The interests of railway companies using or proposing to use electric traction are safeguarded, and it is hoped that a general supply of electricity at a cheap rate will encourage electrification. The development of the scheme, however, must take considerable time.

Passing Stationary Tramcars

It now appears hopeless to expect that any tramway by-law will be authorized for London to prevent other vehicles from passing a stationary tramcar on the near side while passengers are leaving and entering the car. On July 18 the London County Council had before it a report which narrated the previous unsuccessful attempts of the Council to get the Ministry of Transport to countenance a regulation for the prevention of accidents caused by motor and other vehicles driving through tramcar passengers at car-stopping places. It was also narrated that the municipalities of Manchester, Liverpool, Burnley and Preston had unsuccessfully tried to get Parliamentary powers similar to those possessed by Glasgow for several years. On the point made by the Minister of Transport that it is already a statutory offense to drive a motorcar in a manner dangerous to the public, the Highways Committee pointed out that there are considerable difficulties in the way of obtaining evidence except of accidents. In all the circumstances the committee was of the opinion that no purpose would be served at present by seeking Parliamentary powers. The Municipal Tramways Association has, however, been asked to further the legislation.

In reference to street accidents in which tramcars are involved, the London County Council has decided that the following new instructions to be issued to their tramway employees:

"In every case of accident the fullest particulars must be reported at once for the information of the general manager. No information respecting any accident is, under any circumstances, to be given to any member of the public. Every assistance must be given to the police officers, but the Council's servants are reminded that they are not bound to answer any question that may tend to incriminate them, and particularly that in the case of a serious accident any statement may be taken down and used in evidence in the event of a prosecution."

All this, it will be observed, is of special interest to the claims department. In the past there has been considerable clash on the question of giving information about accidents to the police. The latter in London are not, as in other parts of the country, employed and controlled by the local authority; instead they are under the Home Office, a department of the British Government.

Tracks on Right-of-Way

Middlesex County Council recently sent a committee of its members to visit Birmingham and Liverpool to inspect the arterial roads which are being constructed on which high-speed tramway tracks laid on ballast are being built. In the ordinary way street tramways in this country have to be of the most rigid type in order that the tread of the rails shall be absolutely flush with the paving. Hence, heavy rails are laid direct on a 6- or 8-in. concrete foundation, with elaborate rigid rail joints. But if matters can be arranged so that the tramway has its own right-of-way, then sleeper and ballast construction, giving a flexible, cheaper and more silent track, can be adopted. This is what is being done in the two cities mentioned as well as in a few others.

In Liverpool the committee found another complete scheme of arterial roads similar to that of Birmingham. The widths are from 12 ft. to 150 ft. and in one case 250 ft. The cost of track construction is about 50 per cent less than the usual street type, so that the saving sets off the cost of buying additional land for the wide road. Noiselessness, high speed and small wear and tear are features. The committee hopes to see similar arrangements adopted in Middlesex.

In connection with the electrification of Edinburgh tramways, the Town Council has decided to use top-covered double-deck cars on the northern routes where the gradients are as steep in places as 1 in 9. Slipper brakes will be employed as well as the ordinary brakes. The Ministry of Transport has approved the type of car which has been proposed.

The jubilee of Glasgow Tramways is to be celebrated on Aug. 19. It was on Aug. 19, 1872, that the first tramway line in the city was opened for traffic. The tracks were laid by the municipality, who leased them to a company for twenty-three years. At the end of the lease the Town Council took over the working and afterwards converted the system from horse to electric traction and operated it with the great success which the tramway world knows. As to the coming recognition of the jubilee, it is proposed that every employee on Aug. 19 shall be granted a gift of £1, that the members of the corporation and guests be entertained at luncheon, and that a reception and dance be given in the banqueting hall of the City Chambers in the evening.

An Ancient One

After a career of more than fifty years the Plymouth, Stonehouse & Davenport Tramways Company was on July 1 taken over by Plymouth Town Council on the expiring of a lease. The undertaking was the first to be constituted under the much-execrated Tramways Act of 1870. A personal note is that J. Barber Glenn, who was appointed secretary of the company at the outset, has continued to hold that office ever since. During the last two years he has also been managing director. He rode on the first horse car on the line fifty-two years ago and on the first electric car of the company in 1901, and he drove the last car of the company's service on the night of June 30, 1922. Mr. Glenn entertained the officials and employees of the company at a farewell supper on June 28. Thus ends a chapter—and a very long one—in the tramway history of the city of Plymouth.

Tramway Wages

In the light of the general fall in wages in Britain, the employers' side of the National Joint Industrial Council for the tramway industry has given three months' notice to terminate the existing agreement as to tramwaymen's wages, with a view to full reconsideration of the whole question by the National Council.

Arrangements have been completed for the transfer of the underground cable railway known as the Glasgow District Subway from the company hitherto owning and working it to Glasgow Municipality. I have previously referred to the negotiations for purchase of this line which was worked at a loss and to the fact that the purchase money represents only 10s. per £10 share of the company. The company will operate the line until the Town Council can obtain a Provisional Order to purchase it.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Louisville Ordinance Passed

City Legislative Body There Reverses Itself on Recent Action Affecting Louisville Railway Settlement

The city of Louisville, Ky., has changed front in regard to the matter of settlement of its railway problem. Where only a few days ago the city had rejected a settlement ordinance, it turned around on Aug. 24 and passed a bill in favor of the Louisville Railway carrying an initial 7-cent cash fare and a 6-cent ticket rate. There is, of course, a great deal more to the matter than that, but the passage of the ordinance is the big outstanding event of all the recent moves. It is a distinct victory for the management of the company and is regarded locally as largely a personal triumph for President James P. Barnes.

The railway matter at Louisville has been in the public eye for a long, long while now. After several years of scrapping before the former city administration and the present one, without any success for the company, the latter in the early part of 1921 filed injunction proceedings in the Federal District Court, Western Kentucky division, at Louisville, asking an injunction to prevent the city from interfering with the collection of an increased fare. The suit was carried to the United States Court of Appeals, and then to the Supreme Court, which sent the case back to the Court of Appeals on a claim of lack of jurisdiction. The latter court reached a decision favorable to the company.

LITIGATION LAID ASIDE

Rather than continue the litigation an effort was made to pass an ordinance which would prove satisfactory to the city and the company. This ordinance was introduced the latter part of June, and has been buffeted about since that time.

Two weeks ago the measure was defeated by the lower board of the City Council by a vote of twelve to six. By many this was interpreted to mean a reopening of the breach between the company and the city, but on Aug. 22 the ordinance was again placed before the Council and it was passed by a vote of ten to eight. On Aug. 24 the ordinance as passed by the lower board went before the Board of Aldermen and was passed unanimously.

Mayor Huston Quin, who has been away on a vacation, returned to the city on the evening of Aug. 24, prepared to sign the ordinance the next day, in the event that the Aldermen voted in favor of it. For some time it had been well known that the Aldermen were strongly in favor of the measure, the drawback having been with the Councilmen.

On Aug. 25 Mayor Quin called President A. A. Will of the Aldermen and Jacob Isaacs of the City Council to the City Hall, to be present at the signing of the ordinance. This action practically closes the matter and places the railway in a position where it can pay fair wages, keep up its equipment and install necessary improvements.

For a period of eighteen months or so, under a 7-cent fare, the company has been able to put its house in very fair order. Through improvement of the power department, installation of one-man cars on the light travel lines and abandonment of some unnecessary parallel lines the company hopes to be able to save considerable money and to improve its service materially. Eventually the company plans to install lighter cars on its interurban lines.

On Monday, Aug. 28, a letter was mailed to each stockholder arranging for a meeting to be held on the afternoon of Sept. 11 and inclosing a copy of the ordinance, checked against a certified copy, as finally passed by the City Council. The stockholders at the meeting on Sept. 11 will be asked to ratify the plan as carried in the ordinance. A directors' meeting will be held after the stockholders' meeting.

President Barnes at various times in discussing conditions affecting the company has discussed the trackless trolley and the bus as possibilities for development by the company in the future in meeting its transportation requirements. These are all intangible so far as their immediate application is concerned, but the company for some time has been considering plans for enlarging its riverside, or main power plant, on the banks of the Ohio River, and eventually doing away with its old plant on Finzer Street.

New Scale Announced

All wage controversies between employees and trolley companies in Syracuse, N. Y., have ended with the settlement of the wage question on the Syracuse Northern Railroad, operating from Syracuse to Brewerton and South Bay.

The terms of a contract under which the men will receive 48 cents an hour for a ten-hour day have been announced by T. C. Cherry, manager of the company. Under the old contract, which expired on May 1, the men received 55 cents an hour with the same working conditions. When the contract expired the men asked 70 cents and the company demanded 45 cents. A wage of 45 cents has been paid pending settlement of the controversy. The new scale is retroactive to May 1.

Electric Railways Proposed for Arizona, New Mexico and Colorado

Articles of incorporation have been filed in Phoenix, Ariz., with the Arizona State Corporation Commission by the Staley System of Electrified Railway, covering 750 miles of new railway to be constructed in Arizona in the near future. The same people will also make application for the right to build 350 miles in New Mexico and 75 miles in Colorado as soon as advised by the Interstate Commerce Commission, to which body they have already made application for a building permit covering a total of 1,175 miles. They will also file on some 100 miles in Old Mexico, extending from their lines in southern Arizona to the Gulf of California.

The incorporators and directors are R. E. Grace and Judge Carl A. Davis, Phoenix, Ariz.; William L. Staley, Los Angeles; Theodore H. Lohman, San Diego, and W. E. Bell, East Las Vegas, N. M. The officers named are William L. Staley, president; Theodore H. Lohman, vice-president; W. E. Bell, secretary and treasurer. The capitalization is $40,000,000, of which $751,300 is subscribed.

This system in the United States would begin on the Utah-Colorado state line, about 40 miles north of the southwest corner of Colorado, and would extend southerly, passing near Cortez, Colo.; the Shilrock Indian Agency, N. M.; Farmington, N. M.; Grants, N. M., and Luna, N. M., thence down the Blue River and the San Francisco River, passing through Clifton, Ariz.; thence down the Gila River in Arizona to near Safford, Ariz.; and thence westerly, passing near Winkelman, Florence, Casa Grande, Ariz., and southwest to the Arizona-Republic of Mexico boundary line; thence westerly to near Yuma, Ariz. Branches will be constructed to Tucson, Phoenix, Winkelman and Benson in Arizona, and to Durango, Colo.

A very remarkable feature of this new enterprise is included in its articles of incorporation, which say that there shall not at any time be any bonded or mortgaged indebtedness of any description placed or allowed on any of the property of the corporation, either real or personal, or on any other of its assets.

Will Contest Suit.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will contest the suit of the city of West Allis which seeks to compel the company to move its tracks to the center of the road. This removal as ordered would cost the company $1,500,000.

$600,000,000 Construction Program

New York's Mayor Outlines Scheme to Recapture Transit Lines and Build New Routes—Transit Commission Chairman Ridicules Some of Mayor's Proposals

MAYOR HYLAN'S long-heralded plan for new subways and other transit facilities for New York was announced on Aug. 27 at the City Hall and will be presented to the Board of Estimate on Sept. 6.

The plan proposes the spending of $600,000,000 on thirty-five new subway routes, extensions and tunnels, the recapture of the West Side subway line now being operated by the Interborough, the recapture of the whole of the subway system operated by the B. R. T. under the dual subway contracts, the operation of all of these by the city at a single fare, the establishment of a $25,000,000 bus system to feed the subways and the gradual elimination of all elevated and surface lines.

Acknowledgment is made in the general statement that some legislation will be necessary, but the matter of financing the construction program, which is to cover a period of fifteen years, is dismissed more or less casually on the assumption that revenue from recaptured lines will release $500,000,000 of city bonds from the debt limit consideration and that sums available within the debt limit and the revenue resulting from increased assessments will do the rest.

ANNOUNCEMENT MADE BY MAYOR'S SECRETARY

The announcement of the plan was made by John F. Sinnott, the Mayor's secretary, who gave out for publication a twelve-page general statement as to the plan, what it would accomplish and what its execution would cost, a separate document setting forth the proposed new routes in detail, a third document giving twenty-seven "salient features" of the plan and a fourth paper giving the order of construction.

One of the outstanding characteristics of the statement issued by the Mayor is that he does not use the word "may" at all, but definitely says that the city "will" do this and do that. He further asserts that the plan will not only be adopted but that work on the proposed new lines will commence virtually at once and that much of the work, as well as the recapturing of the lines at present privately operated, will be accomplished before his term ends.

The statement is a mixture of constructive proposals, historical statements and criticism of the dual subway contracts, the Transit Commission, Governor Miller, the Republican legislature and George McAneny. It contains also many statements as to the purposes to be accomplished, with several references to the 5-cent fare and "the longest ride obtainable anywhere on earth for a nickel."

The plan includes, says the Mayor's statement, new subway trunk lines in and to all boroughs, other new subway lines, extensions to existing lines and a bridge and tunnels uniting all boroughs —in all, thirty-five new subway routes, extensions and tunnels. Says the Mayor:

> The city intends to spend $600,000,000 during the next fifteen years to construct and equip these new rapid transit lines. It intends to begin its first construction immediately—as soon as the necessary detailed plans can be prepared by the engineers—and it intends to have new subway lines in operation before the expiration of the term of the present elected city officials. The construction of these new rapid transit lines will go on at the same time in all boroughs.
>
> These new rapid transit lines will be constructed by the city itself. The city will have no partners in this gigantic enterprise and it will entertain no partnership in the operation of any of these lines when finished. It will be exclusively a city undertaking.

Under the heading, "Salient Features of Mayor Hylan's Plan for Real Rapid Transit," the following summary was given out by John F. Sinnott, his secretary, at City Hall:

> It provides thirty-five new subway routes, extensions and tunnels.
>
> It provides 126 miles of new subways and tunnels, in addition to 111 miles of existing city owned rapid transit lines, making a total of 237 miles.
>
> It provides 379 miles of single track (two rails) in addition to 331 miles now in use, making a total of 710 miles.
>
> It provides new rapid transit lines costing with equipment $600,000,000 (exclusive of tri-borough bridge and Staten Island tunnel) besides the city's investment of $300,000,000 in existing lines.
>
> It provides for "recapture" of 97 miles of existing subways in 1925 and 1926.
>
> It provides for immediate construction of new subways and tunnels in, through or to all boroughs.
>
> It provides the longest ride anywhere on earth for a nickel.
>
> It provides for unified city operation of all city-owned rapid transit lines on a 5-cent fare.
>
> It provides for the termination of the city's contracts with the Interborough and Brooklyn Rapid Transit.
>
> It provides a new and direct route to Coney Island.
>
> It provides complete direct routes to the new boulevard across Jamaica Bay to the Rockaways.
>
> It provides direct rapid transit routes from Washington Heights, Harlem and the Bronx to Queens, Brooklyn and Staten Island without passing through Manhattan Island.
>
> It provides for a bridge and tunnel making the north short of Long Island directly accessible to the upper part of Manhattan Island and the Bronx.
>
> It provides six new tunnels besides the one to Staten Island.
>
> It provides for immediate transit relief in all boroughs by the use of city-owned buses, until the new rapid transit lines are built.
>
> It makes every part of every borough easily accessible to every other borough at a 5-cent fare.
>
> It will add hundreds of millions of dollars each year to the assessed valuation of taxable real estate expanding the city's borrowing margin and increasing the city's annual revenues.
>
> It will induce and stimulate the construction of new residential and business buildings in all parts of the city for many years.
>
> It will spread prosperity in all boroughs.
>
> It will ultimately result in the elimination of all elevated structures and in the construction of additional underground rapid transit lines.
>
> It will ultimately result in the removal of all surface tracks, the discontinuance of surface car operation and the installation of a city-wide and city-owned bus system to be operated in conjunction with the city's new rapid transit lines.
>
> It will put an end to the illicit and unwarranted attempts of private operating companies to increase car fares in New York City.
>
> It will result in the complete elimination of strikes and incident tie-ups because it provides equitable working conditions for railway employees.
>
> It will end Wall Street manipulation and stock jobbing with city transportation securities.

Chairman McAneny of the New York Transit Commission charges that the Mayor's plan is "wholly deceptive" and meant to be so, inasmuch as the Mayor and his transit advisers must have known that the power of initiation for construction of new lines rests wholly with the Transit Commission and that the city is powerless to act without its approval. Mr. McAneny said:

> The Mayor's choice of a time for the launching of a plan, after five years of inaction and nearly a year after the appearance of the plan of the Transit Commission, suggests irresistibly that the discussion he is provoking is expected to parallel the period of the political campaign.
>
> His choice of time, of course, is a circumstance that the Transit Commission cannot alter. The commission, however, is quite prepared to enter into any discussion that the proper enlightenment of the public demands, whether now or at any other moment, and will proceed accordingly.

In criticising the financial features of the Mayor's plan Mr. McAneny declared that the Mayor has failed to include many expenditures which will add almost $200,000,000 to the estimate of $600,000,000. Some of those listed by Mr. McAneny were the cost of tearing down the elevated structures and of extinguishing the franchises for the surface lines. Although the Mayor proposes to do away with elevated and surface lines eventually, he does not take into consideration, according to Mr. McAneny, that the courts have repeatedly held that bus lines cannot parallel routes for which the surface companies hold franchises.

COMMISSION CHAIRMAN DISAGREES WITH MAYOR

The Mayor's plan said that the city's present borrowing margin was $150,000,000, and this would be sufficient for the initial expenditures. According to Mr. McAneny, however, this amount does not really exist, and if it did it is already mortgaged for present engagements, such as $35,000,000 to complete the dual subway contracts and $60,000,000 for the Staten Island tunnel. There is also $25,000,000 that the Hylan administration plans to spend for a bus system, and this amount is not included in the $600,000,000 estimate. Nor is the money for the Staten Island tunnel, or for the tri-borough bridge.

The amount needed to recapture the two lines on which the Mayor's whole plan is based was put at $60,000,000 by the Mayor a few weeks ago, but Mr. McAneny declared that this sum was only a fractional part of the sum required. The amount needed to recapture the two lines, according to the chairman of the Transit Commission, would eat up the $150,000,000 quoted as the city's present debt margin.

In reply to the Mayor's contention that adoption of his plan would mean a permanent 5-cent fare. Mr. McAneny declared it would have just the opposite effect.

The Truth About Buffalo

Brilliant Account of Issues There Written for Philadelphia Public Ledger by Its Special Correspondent

Raymond G. Carroll has placed lucidly before the people of Philadelphia through articles contributed by him to the *Ledger* of that city a complete statement of the issues involved in the Buffalo strike. Mr. Carroll writes for the *Ledger* from New York City regularly, but went to Buffalo to cover this assignment on the spot. He is a newspaper man of long training and is familiar with labor issues through many years of experience on the newspapers in New York, and with railway and commission regulatory matters through specializing on these subjects when connected with the New York *Evening World*.

Raymond Carroll is both a forceful and brilliant writer. His accounts show the human interest touch in him to be highly developed. For this reason some of the things he says appear perhaps to be overdrawn, but that is accounted for more because of the setting in which the reader finds them than because they are lacking in any of the essentials of accuracy. Mr. Carroll, for instance, does not hold the Buffalo newspapers in very high regard. It is one thing of course to say that, but it is quite another to paint the picture of a vacillating press as Mr. Carroll has done. He says:

> The leading English-language newspapers of Buffalo are largely in the hands of second-generation direction, and it has not been proved anywhere that genius is inherited.
>
> With one exception, the lake journals follow the policy of least resistance, straddle most public questions, and take no decided stand upon anything. They are lukewarm upon the best civic issues, and handle their "one-fifth Mayor," Schwab, with velvet gloves. That virtually every civic organization has denounced the street railway strike caused barely a ripple in their placid editorial unconcern over a walking multitude.
>
> The substantial citizens of Buffalo would welcome some new blood in the city's fourth estate.

The reader wonders, perhaps, how Mr. Carroll knows that Buffalo citizens would welcome such a change, but feels instinctively from what Mr. Carroll has said about the papers it would be the natural reaction of a public so supinely represented to desire a change.

Most of the story as told by Mr. Carroll is well known to readers of the *Electric Railway Journal* through the accounts of the issues of the strike that have appeared in this paper. Of the reasons for the strike as Mr. Carroll has analyzed them he says:

> "Stop Mitten at Buffalo," is the dictum of Gompers, Morrison, Mahon & Company, who fear that it will spread to other corporations than those engaged in supplying transportation. Those national leaders of organized labor do not want the toilers sharing in the profits proportionate to their effort, and participating in the management with their employers; they want toilers docile only to their edicts, paying their membership dues without a murmur, year in and year out.
>
> That is why the Buffalo strike has become a national affair, one of the most remarkable crusades in the history of capital and labor. And Mitten is going to win if he gets a square deal, and we of the telling craft are here to do what was our mission to France in the world war, "watch the boys from Pennsylvania make their objectives." If the New York newspapers don't think Philadelphia means business, let them send some really clever writers up here to talk with the lads in "the Mitten citadel."

Of politics in Buffalo Mr. Carroll says:

> One revelation of the Buffalo strike is the exposure that it has been of the fallacy of the commission form of government, a system that foists upon the taxpayers incompetent officeholders, who create what local legislation they choose, administer it as they like, and are responsible to nobody. Selected as candidates under the Direct Primary Law, the "five rulers" of Buffalo, represent a mediocrity that aghasts.
>
> The city's "one-fifth Mayor," Frank X. Schwab, is a former brewer, violently anti-prohibition, yet the votes of the East Side have put him in control of the police, fire and health departments. He had been no sooner in office than his acts demonstrated that "X," the unknown quantity in his name, stood for "organized labor." That fact gave the local minions of Gompers, Morrison, Mahon and Company their power to persuade the humble street railway workers that a strike was a sure-fire win.

Improvement Program Under Way in Southern California

A large program of improvement work is now being carried on by the Pacific Electric Lines, a large portion of which became necessary principally through franchise and legal obligation, while other improvements under way involve construction of new freight switching and freight storage sidings to take care of increased freight business, new substation in Hollywood to handle increased passenger business, rock ballasting Long Beach four-track line to place line in proper condition to handle heavy freight and passenger traffic, block signals on the Pasadena four-track short line and two interlocking plants on the La Habra-Whittier line. The estimated cost is $950,000. The following is the schedule of the improvement jobs now under way and contemplated within the next few months:

Long Beach—Four-track line on private right-of-way in Los Angeles from Ninth Street to Slauson Avenue, 2.7 miles four-track line; ballast with crushed rock.

Pasadena—North Raymond Avenue from Colorado Street to North Fair Oaks Avenue carhouse. Reconstruct and repave 1,000 ft. of double track, replacing 6-in. 72-lb. Tee rail with 7-in. 128-lb. grooved girder rail; rock ballast (mechanically tamped); renew redwood ties 6-in. x 8 x 8 ft. with creosoted Oregon fir ties; rail braces and tie plates; continuous joints; double concealed bonds; 7-in. asphalt concrete paving.

Pasadena—North Fair Oaks Avenue from Colorado Street to Walnut Street. Reconstruct and repave 1,221 ft. of double track, using the same type of construction as above on Raymond Avenue.

Los Angeles—South Hill Street from Eighth to Pico Street. Reconstruct and repave 3,158 ft. of double-track combination-gage track. Same type of reconstruction as indicated above for Pasadena jobs.

Los Angeles Harbor—Wilmington. Construct 19,842 ft. equivalent single track of freight storage trackage consisting of five freight sidings, total capacity 382 cars, using 60-lb. and 70-lb. rail. To provide additional storage facilities for freight traffic to and from the harbor.

Long Beach—Four-track line; also Long Beach double-track line; Kent Station, Dominguez Station and Abila Station. Construct three freight sidings, total length of trackage 4,674 lin.ft. of single track, total capacity 94 freight cars, using 60-lb. A.S.C.E. rail. To provide amply freight passing sidings on this line to avoid interruptions to interurban trains.

Pasadena four-track short line—Install automatic block signals between Sierra Vista and Oneonta Park, using six four-track steel signal bridges for mounting signals; 1 mile of four-track line to be block-signaled. Improvement made due to this section of the Pasadena Short Line consisting principally of long curves; signals required account increased traffic and to afford proper spacing for trains and increase safe operations.

Long Beach—American Avenue from Sixth Street to Ocean Avenue. Reconstruct and repave 2,735 ft. of double track, replacing 60-lb. A.S.C.E. rail with 7-in. 12-lb. grooved girder rail; rock ballast (mechanically tamped) renew redwood ties with 6 in. x 8 in. x 8 ft. creosoted Oregon fir ties; rail braces and tie plates; continuous joints; double concealed bonds; 7-in. asphalt concrete paving.

Los Nietos Station—Whittier line over Atchison, Topeka and Santa Fé Railway Company's San Diego Line. Install mechanical interlocking plant to provide protection for railroad grade crossing; electric interurban over steam road line.

La Habra Station—Whittier-La Habra line. Install all-electrically operated interlocking plant at railroad grade crossing of the Union Pacific System's Whittier to Fullerton new extension, where same crosses the Pacific Electric's interurban line.

Whittier line—Eyer Station-San Gabriel River. Replace 800 lin.ft. double-track pile trestle with 560 ft. common standard double-track pile trestle and four 60-ft. steel girders on concrete piers; remaining 830 ft. double-track pile trestle to be filled in. Flood control work.

Hollywood—Install Automatic Substation. Reinforced concrete fireproof structure, 1,500-kw. automatic substation machines. Also, reinforcement of transmission line between Sherman and Vineyard, approximately four miles, and construct new transmission line from Sherman to new substation at Hollywood.

Redondo Beach Resort—Install fifty floodlights to add to the attractiveness of the company's amusement structures and concessions operated at this popular resort.

Men Seek Former Wage

The petition of the employees of the Memphis (Tenn.) Street Railway to have the recent wage award of the arbitration board set aside and their former wage scale restored has been forwarded to Judge J. W. Ross at Jackson, Tenn. The petition reasserts the men's acceptance of the award as made by the arbiters and their determination to abide by their contract with the company at a sacrifice, but it is pointed out that this will mean a severe hardship upon the men's families this winter if the wage cut stands.

The officials of the company were asking a reduction in accordance with present costs of living as compared with last year. Employees were seeking an increase of 7 cents an hour over last year. For a time a strike was threatened, but this action was voted down.

Issues Order Covering Overhead Line Construction

In accordance with its Decision No. 10387, based on Case No. 1615, which involves the matter of the investigation on the commission's own motion, of the reasonableness of proposed uniform standards of overhead line construction for the State of California, the California State Railroad Commission has issued general order No. 64 covering rules for overhead line construction, which became effective July 1, 1922.

The commission was of the opinion that the application of the rules as specified in the general order would promote uniform and higher standards of construction and would insure more adequate service and greater safety to men engaged in the operation and maintenance of overhead electrical lines.

Remaining Lines to Open

International Having Established Normal Service in Buffalo Prepares to Start Up in Niagara Falls

Mitten Management, Inc., operating the local and interurban lines of the International Railway, Buffalo, N. Y., will never sign an agreement with the Amalgamated Association of Street & Electric Railway Employees of America and will continue to employ labor only on the open-shop plan, Henry W. Killeen, of Penney, Killeen & Nye, of counsel for the International, told Justice Harley N. Crosby in special term of Supreme Court. Mr. Killeen was arguing against efforts of the Buffalo Jitney Owners' Association to have the court vacate the injunction prohibiting them from operating within the city.

Justice Crosby reserved decision on the motion of the jitney drivers to vacate the injunction. Hamilton Ward, who appeared as attorney for the jitney men, is a prominent negligence lawyer in Buffalo who has conducted many suits brought against the International in accident cases.

Efforts on the part of the jitney owners to have the court appoint a referee to hear the testimony of Herbert G. Tulley, president of the International, failed when Justice Wesley C. Dudley declined to stay or modify an order previously obtained by counsel for the International restraining the examination of President Tulley by the jitney men.

Providing the municipal authorities furnish adequate police protection, local car service will be started in the city of Niagara Falls at 6 a.m. Sept. 4. It had been proposed to resume local service in Niagara Falls Aug. 28 but the city authorities were unable to guarantee sufficient police protection. The only service not being given by the company is in the cities of Niagara Falls and Lockport and on a few local lines in Buffalo where owl service has not yet been restored. On all other lines normal day and rush-hour service is being furnished.

Despite the injunctions obtained by the International restraining the operation of jitneys, hundreds of 10-cent buses are being operated unmolested by the police. Responsibility for this situation is placed squarely up to Mayor Frank X. Schwab by President Tulley. Attorney Killeen of the railway told the court that the police are willing to do their duty but "the Mayor has bedeviled them." Some arrests of jitney drivers have been made for technical violations of the traffic laws, but no driver has been charged with contempt of court for violation of the injunction of Justice Pooley.

Since the arrest of Robert C. Lacey, chairman of the board of arbitration of the Central Labor Council and former president of the organization, and five striking street car employees, members of the Amalgamated, there have been no further dynamite outrages on the local or interurban lines of the International. Previous to their arrest cars were dynamited almost nightly. Burns and Pinkerton detectives are working on the case. Local newspapers charge that the city police have so bungled the evidence and clues being obtained by private detectives that some of the union leaders against whom evidence was sought are thus far escaping detection.

Wage Hearing Concluded

The arbitrators' hearing on the question of wages to be paid by the Berkshire (Mass.) Street Railway was concluded on Aug. 25. C. Q. Richmond, general manager, told of the struggle of the company to make both ends meet. Thomas E. MacDonald, superintendent of the company, testified that fifty-five of the 300 employees own their own homes and forty of them own automobiles. Leslie Vickers, an investigator of industrial statistics, testified that living conditions were 20 per cent better than in 1914, as computed on the ratio of wages to the cost of necessaries, offering charts in evidence.

From the information submitted it appeared that, as against approximately 47, 50 and 53 cents an hour now paid to blue uniform men on two-man cars for the first, second and third years, respectively, the company proposed to pay 45, 47 and 50½ cents in renewal of the contract that expired on June 1. One-man car operators, who now receive 6⅜ cents additional to these figures, were to be paid 5 cents additional. These rates, it was stated, are the same as those established by arbitration this year for Connecticut Company employees. In lieu of these figures the men presented a demand to cover the year ending June 1, 1923, of 60 cents an hour for the first three months' service, 62½ cents an hour for the next nine months and 65 cents an hour thereafter. For operators of one-man cars 10 cents an hour additional was asked. The arbitrators will have further meetings to discuss the evidence and make a decision as soon as practicable.

Planning Other High-Speed Lines in Philadelphia

Mayor Moore of Philadelphia and President Mitten of the Philadelphia (Pa.) Rapid Transit Company recently discussed plans on the construction of other links in the network of high-speed lines for the city. The date for opening the Frankford Elevated to the public has been fixed as Nov. 5. Once the line has been placed in service, the Mayor said he would authorize the preparation of plans for the construction of other high-speed lines and among the first consideration would be the Broad Street subway, for which $25,000,000 was available. Mr. Mitten promised his aid in the building of other lines to care for the "present and coming needs of the city" and Richard Weglein, president of the City Council, pledged his co-operation.

Franchise for Hollywood Subway Grants

The Pacific Electric Railway on Aug. 18 was given formal permission to construct a subway under Bunker Hill, from the Hill Street Terminal of the company to Glendale Boulevard, in order to furnish rapid transit transportation to Hollywood and other northwestern parts of the city of Los Angeles and its suburbs. The project will represent an expenditure of $3,100,000 by the Pacific Electric Railway and will have the effect of removing all of the company's cars from Hill Street north of the company's Hill Street terminal. The Pacific Electric was the only bidder for the subway franchise at $100. It is a forty-year franchise. The engineering plans have been completed, rights-of-way for the subway have been secured, and construction work will start within a few months, officials of the company state. The City Council has instructed the city attorney to submit the necessary ordinance granting the franchise to the railway. Application for the franchise was made some months ago by the company, but the matter was thoroughly considered by the Board of Public Utilities and the Public Utilities Committee of the City Council before final action was taken.

Power Development Made Subject of Special Study

At a meeting of the executive committee of the Potomac Public Service Company, Hagerstown, Md., it was decided to install additional machinery in the plant at Millville. This step is made necessary by the great demands for power coming from all sections, and it is felt that additional generating equipment there is needed. It was brought out that the Potomac Public Service Company with all its power plants and water power, is using power to about the extent of its capacity when it is taken into consideration that a specified amount should be held in reserve to guarantee service. The remarkable growth in the power business was studied and it was felt that, as rapid as has been the demands for current the past two years, the same rate of growth can be expected for the next two years.

Urges Working Together for Railway and Personal Prosperity

All platform employees of the San Diego (Cal.) Electric Railway have been urged to show the highest possible degree of efficiency in the operation of cars and in the handling of patrons in a booklet compiled by Claus Spreckels, general manager of the property. He says that it is the aim of the company to make the railway one of the most efficient in the country and that efforts of all employees must be centered on one thing only, that of selling transportation. In conclusion he says:

> We believe the better service we give the greater will be our revenue, keeping in mind the fact that our own personal welfare and prosperity depend upon the prosperity of our car lines.

Financial and Corporate

Excellent Brooklyn Showing

Deficit of $350,857 for 1921 Converted Into Surplus of $1,765,527 in 1922

Striking improvement in the financial position of the Brooklyn (N. Y.) City Railroad is shown in the annual report of Vice-President H. H. Porter, a surplus of $291,519 replacing the deficit of $1,474,008 in the balance sheet of a year ago. Profit for the year ended June 30, 1922, aggregated $1,765,527. Announcing these figures, Mr. Porter pointed out that the value of the property of the company was greatly in excess of the capitalization of $12,000,000, and the bonded debt of $6,925,000.

The income statement appended to the report shows that the total operating revenue for the year was $11,687,750, contrasted with $10,457,171 during the corresponding period of 1921. Total operating expense was $8,450,221, as against $9,715,666. Gross income was $2,466,958, while in 1921 it was $332,832. Net income is given as $1,765,527. In 1921 this item was represented by a loss of $350,857.

BOOKS DON'T SHOW EXTENT OF IMPROVEMENTS

A note added to the condensed general balance sheet says:

> The books of the company do not reflect the additions and betterments to the property made by the Brooklyn Heights Railroad as lessee and claimed by it to have amounted to approximately $10,000,000, nor any liabilities in respect thereof, nor the claims of the Brooklyn City Railroad arising out of the termination of the lease; the amounts of these several items are in dispute.

The subway is not crowding out the surface lines as a factor of transportation, according to Mr. Porter, who says:

> The increased use of the recent subway extensions in the territory served by your company has resulted in diverting a certain amount of long-haul traffic to the subways, but any decrease in gross earnings from this cause has been more than compensated for by increased net earnings from short-haul traffic which the company has secured because of its frequent and convenient service. This is a particularly gratifying demonstration of the fact that your surface railroad is not only far from obsolete, but that it has an increasingly valuable function to perform which the public has recognized by its increased patronage.

After a thorough consideration of the report of the valuation Bureau of the New York Transit Commission, Mr. Porter declares:

> Your directors concluded that they could not recommend to the stockholders the acceptance of any of the appraisals made by the valuation bureau of the commission or the sale or disposal of the property of your company upon any basis except its present fair value.

The company maintains and operates a total of 216.92 miles of railroad on 110.2 miles of streets, and in addition owns various car houses, shops and other real estate, including the office building at 168 Montague Street and 85 Clinton Street.

The gross revenues from transportation have continued to increase during the year. This is due both to the growth of business and population in the territory served and to increased riding resulting from better service furnished by the company to the public. Operating expenses are less than during the previous year in spite of the fact that the company is, in addition to meeting all current maintenance, now engaged in the extensive reconstruction of its track system, replacing the old 94-lb. rail with new rail weighing 122 lb. per yard. During the season of 1922 it is planned to rebuild approximately 64,500 ft. of track, all of which will be laid in improved pavement.

INCOME STATEMENT OF THE BROOKLYN CITY RAILROAD

	Year Ended June 30, 1922	Year Ended June 30, 1921
Passenger revenue	$11,413,403	$10,179,968
Other car revenue	247	276
Total transportation revenue	$11,413,650	$10,180,244
Advertising and other privileges	100,004	118,393
Rent of land, buildings, etc.	127,499	115,654
Rent of tracks and terminals	46,054	41,785
Miscellaneous revenue	543	1,095
Total operating revenue	$11,687,750	$10,457,171
Operating Expenses		
Maintenance—way and structures	$1,203,973	$969,603
Maintenance—equipment	1,368,205	1,741,844
Power	986,910	1,200,983
Operation of cars	3,835,850	4,828,561
Injuries to person and property	524,310	522,859
General and miscellaneous expenses	530,973	451,816
Total operating expenses	$8,450,221	$9,715,666
Income before taxes	$3,237,529	$741,504
Taxes assignable to operation	931,521	500,515
Operating income	$2,306,008	$240,989
Non-operating income	160,950	91,843
Gross income	$2,466,958	$332,832
Income Deductions		
Interest	$428,319	$362,269
Rent of cars, tracks, etc.	273,111	321,420
Total income deductions	$701,430	$683,690
Net income	$1,765,528	*$*350,857*

* Figures in italics denote loss.

During the year the company carried 243,538,467 passengers, an average of 667,228 passengers a day. This was an increase of 27,330,747, as compared with the previous year, or a gain of about 75,000 passengers per day. To accommodate this increased traffic the company operated 24,265,037 passenger car-miles, as compared with 23,594,065 during the previous year.

Mr. Porter warns that if municipal railway operation is carried out over the Williamsburg Bridge the Brooklyn City Railroad will cease all operation over the bridge. In his review of the affairs of the company Mr. Porter goes briefly into the history of this case as argued before the courts.

Edinburgh Tramways Shows Increase in Traffic

The report of the tramways department of the city of Edinburgh shows a total revenue for the year ended May 15, 1922, on the combined cable, bus and electric systems of £834,341, an increase over the previous year of £43,260. The number of passengers carried was 101,026,763, an increase of 3,014,881. The revenue last year was divided approximately 68 per cent cable, 22 per cent bus, and 10 per cent electric, but all the cable lines are now being converted into electric power, as previously reported in this paper. After deduction of interest, contribution to sinking fund, special expenditures and income tax, the system showed a net surplus on the year's workings of £24,571, which is considered quite satisfactory under the conditions in which the department has been operating. The revenue during the latter part of the year showed a distinct tendency to decline, due in part to slightly longer fare stages but also to prevailing bad trade. The coal strike was responsible for an increase in the cost of fuel during the early part of the year. The company owns 184 cable cars, forty-five electric cars, seventy-two single deck motor buses and fifteen char-a-bancs.

Indiana Merger Case to Be Argued in October

Oct. 4 has been set in the Indiana Supreme Court as the date for the presentation of oral arguments by attorneys on the appeal of the Indiana Public Service Commission and the Indiana Electric Corporation from the judgment of the Superior Court in Indianapolis sustaining the complaint filed some time ago by the cities of Indianapolis and Kokomo asking for an injunction to prevent the execution of the order of the commission which authorized the consolidation of seven Indiana electric, traction and gas utilities into the Indiana Electric Corporation. In setting the date for oral arguments, the court directed the attorneys for the cities of Indianapolis and Kokomo to file briefs of arguments before Sept. 4 and the attorneys for the corporation and the Public Service Commission to file their briefs before Sept. 19.

In overruling a demurrer filed to the injunction suit, the Superior Court judge said the action of the Public Service Commission in authorizing the consolidation and approving the issuance of securities for the consolidation was without authority and without force and effect. The cities, he said, have a right to maintain an action to enjoin the carrying out of the commission's order.

It was around the agitation in connection with the Kokomo case that the demand arose in political circles which threatens to manifest itself next winter in an appeal to the Legislature to amend the Public Service Commission law along the line of home rule.

Revised Plan Outlined

Pamphlet Issued Giving Details of Latest Security Exchange Proposed for Key Route

A pamphlet has been issued setting forth the latest revised plan for the reorganization of the San Francisco-Oakland Terminal Railways, Oakland, Cal. Briefly, it provides for the organization of an operating company and some subsidiaries, the stock of which shall be owned by the operating company. These companies are to succeed to the property now owned by the old companies.

The old securities, amounting to $48,879,000, have been segregated into four groups, based upon priorities of issue, security and market value and other practical considerations.

The first group includes $465,000 of bonds secured by two first mortgages on the Oakland, San Leandro & Haywards Electric Railway and the Twenty-third Avenue Electric Railway. It is proposed to exchange these, bond for bond, for new bonds with practically the same security, but maturing in 1938.

The second group consists of various first mortgage bonds and Oakland Transit Consolidated first consolidated 5 per cent bonds, amounting to $7,538,000, which will be exchanged, bond for bond, for the new operating company general and refunding 5 per cent bonds.

The third group includes $3,634,000 of junior bonds, which will be exchanged for an equal par value of the two classes of preferred shares of the new company, divided three shares of the 7 per cent cumulative prior preferred stock and one share of 7 per cent preferred stock.

The fourth group includes $3,177,000 Oakland Traction Company general consolidated 5 per cent bonds and $1,587,000 San Francisco, Oakland & San Jose Consolidated Railway general consolidated 5 per cent bonds, which will be exchanged for an equal par value of the two classes of preferred stock, one-half of each kind.

The old preferred stock now outstanding will be exchanged for the common stock of the new company on the basis of four shares of the old for one of the new. The old San Francisco-Oakland Terminal Railways common stock is wiped out entirely.

The general and refunding 6 per cent mortgage bonds, maturing in fifteen years, which are issued in exchange for old securities, will be junior to a first mortgage issue of $10,000,000, of which $2,500,000 will be issued at once, to provide cash required for the complete working out of the plan; $1,000,000 of this issue must be taken by owners of the new common stock as a condition of the issuance of that stock to them.

Old securities of $48,879,000 are thus reduced to new securities amounting to $22,163,500, which will be junior, except as to $465,000 to a $10,000,000 first mortgage. This $10,000,000 is in the nature of cash, for the reason it will pay off $703,000 equipment trust notes in cash and will provide for additions and betterments which will add to the tangible worth of the company's property.

The floating indebtedness of the old company will be paid in full and all past due coupons, except as to the bonds in the first group, are to be refunded into the new issues of bonds or preferred stock, as the case may be.

Notice was given that those depositors who deposited their bonds under the agreement of Dec. 1, 1919, and who did not withdraw their bonds on or before Aug. 20, 1922, would be deemed and treated as assenting to the new plan.

New Company Applies for Charter

The New Orleans Public Service Corporation, which has acquired, by purchase, the properties of the New Orleans Railway & Light Company, New Orleans, La., has filed application for a charter. The new company is given a nominal capitalization of $5,000, with the privilege of increasing its capital to $100,000,000. The capitalization is divided equally between preferred stock and common stock. The preferred stock holders have no voice in the management of the affairs of the company, except in regard to deferred dividends, and the stock is made redeemable by a majority vote of the holders of the common stock.

Separate Company for Small Load

The Green Bay Park Railway has been organized and incorporated to take over the property of the Bay Shore Railway, consisting of about 1½ miles of track leading from the city to a municipally owned and operated amusement park open only during the summer months.

The property was operated by the Wisconsin Public Service Company last year on contract with the owners and showed no profit, it is said, and has been more or less constantly in controversy between the owners and the city officials.

The new company was organized by Clement C. Smith, Milwaukee, and his associates, owners of the Wisconsin Public Service Company, to take over the property, when it was agreed that the transfer should be made for an amount to be fixed by the appraisal of the Wisconsin Railroad Commission. The commission has agreed to act as arbitrator and fix the value of the property. Pending the decision of the commission the line is being operated.

C. R. Phenicie, general manager of the Wisconsin Public Service Company, said that his company was not anxious to purchase the property because of its record of constant loss, but that the public seemed to expect his company to help out in the controversy between the city officials and the Bay Shore Railway. "It was thought unfair," said M. Phenicie, "to harness the Wisconsin Public Service Company with so unprofitable an enterprise and so the new company was incorporated."

Traffic Increases on Brazilian Tramways

The board of directors of the Brazilian Traction, Light & Power Company, Ltd., Brazil, S. A., has submitted its ninth annual report and accounts to the shareholders for the year ended Dec. 31, 1921, together with a report by the president on the enterprises in Brazil. The revenue of the company in Canadian currency follows:

Revenues received under contracts with subsidiary companies	$4,410,057	
Interest on investments and miscellaneous income	127,658	
		$4,537,715
General and legal expenses and administration charges	$166,465	
Interest and changes on secured gold notes and other loans	833,568	
Provision for general amortization	300,000	
		1,300,033
Net revenue		$3,237,682
Dividends on preference shares at 6 per cent per annum		600,000
Surplus for the year		$2,637,682

The surplus revenue as shown in the table alone amounted to $2,637,682, which with the balance of $3,082,132 brought forward from 1920 gives a total of $5,719,814, which has been carried forward in profit and loss account.

The growth of the tramways service in Brazil is shown in the following figures. In 1918 there were 283,682,656 passengers carried; in 1919, 332,525,451; in 1920, 377,396,013, and in 1921, 412,176,127.

The report mentions the extensive power development which the directors have under way and which will benefit Rio de Janeiro and Sao Paulo. On the subject of new financing it is said that necessary capital requirements will be provided through the sale of securities. These requirements will include the amount necessary for the development of the hydro-electric installation at the Parahyba River just referred to and the funding of $7,500,000 6 per cent secured gold notes.

The annual meeting was addressed by E. R. Wood, a director, who told about the changes which have taken place in conditions in Brazil during the past year. In referring to the company's financing, he stated that of the $7,500,000 of company's notes maturing in December, there had already been redeemed in anticipation $2,000,000 and for the redemption of the balance the company had the necessary $5,500,000.

Deficit Changed to Surplus

For the five months ended May 31, 1922, the Nova Scotia Tramways & Power Company, Halifax, N. S., reports gross earnings of $635,552, against $653,118 for the same period in 1921. Operating expenses decreased from $579,619 for the five months of 1921, to $489,965 for the five months of 1922. The surplus for the five months period of this year was $53,685, against a deficit a year ago of $11,822.

Commission Statistics Reveal Railways' Plight in 1921

A reflection of the heavy odds against which city and suburban electric street railways in Ohio had to contend during the general business depression of the year 1921 is observed in statistics for those companies just compiled and made public by the State Public Utilities Commission at Columbus. These figures show that the city and suburban traction companies in Ohio carried 59,299.578 fewer passengers last year than they did in 1920, the total number of revenue car riders including transfer passengers for the state in 1921 being 719,242,805 as against 778,542,383 in 1920. During the past several months, however, general business conditions have picked up to such an extent that almost all of the eighteen city and suburban car companies in the State are carrying more riders than they were a year ago.

Operating revenues of the companies in 1921 decreased $1,355,066 over 1920. Operators of the properties, however, by practicing rigid economy, managed to reduce operating expenses $3,063,386 in 1921 over 1920. Of course the figures for operating expenses do not include anything for depreciation, taxes or interest on funded debt. A comparison of the revenues and expenses of the eighteen companies operating in Ohio for the two years follows:

	1921	1920
Operating revenue..	$39,383,780	$40,738,846
Operating expense..	30,630,491	33,693,877

Despite the fact that the revenue of the car companies decreased during the year, taxes for 1921 paid by these same companies increased $99,557, the taxes paid in 1921 totaling $3,047,993, while the amount in 1920 was $2,948,436.

The total investment in the city and suburban traction companies in Ohio at the beginning of this year was $110,685,740, according to the commission's figures.

Abandonment Authorized

Upon a finding that revenue is far below operating costs, the Railroad Commission of California has authorized the Sacramento Northern Railroad to suspend operation between Front and "M" Streets, Sacramento, and Headquarters Station, Yolo County.

This service was started in 1913 under an agreement whereby the West Sacramento Company was to defray the cost of operation. This company has not continued its payments and up to Feb. 1 of this year there was found to be due to the railroad $7,685.57.

In referring to objections made to the application to discontinue service the commission said:

> It is obvious from the record in this proceeding that it is impossible to continue operation without a very considerable monthly deficit and such deficit has been accumulating. Protestant. West Sacramento Company, offers no solution of the problem in that it has frankly stated, through its attorney, its inability to meet the present accrued bills and the expense of operation which would accumulate in future. This is not a matter in which any adjustment or increase in rates would offer a solution of the transportation problem, as any rate which would be assessed in volume sufficient to meet cost of operation would be prohibitive.

Financial News Notes

Line Abandoned.—The Meridian Light & Railway Company, Meridian, Miss., has been engaged in the work of taking up the tracks of the college car line extending from Highland Park north for about 1 mile. It was reported that a bus line would be substituted for the abandoned car line.

Increase in Capital Stock Authorized.—The State Corporation Commission has authorized an amendment to the charter of the Scranton & Wilkes-Barre Traction Corporation, Scranton, Pa., increasing its capital stock from $2,500,000 to $5,000,000. The headquarters of the corporation are in Richmond.

May Resume Operations.—Funds are said to have been raised to operate the defunct Norwalk-Shelby traction line with gasoline cars as soon as the tracks can be cleared. A new company has been incorporated by J. L. Baugh, Indianapolis; C. R. Irwin, North Fairfield, and others to carry out the plan.

Stock Recently Created Pays Dividend.—The United Light & Railways Company, Grand Rapids, Mich., has declared an initial dividend of 1¾ per cent on participating preferred stock and the regular quarterly dividend of 1½ per cent on the first preferred stock, both payable on Oct. 2 to stock of record of Sept. 15.

Six Months' Report Made.—For the six months ended June, 1922, the Illinois Traction Company, Peoria, Ill., reports gross earnings of $11,067,462 against $10,931,727 for the same period in 1921. After expenses and taxes a net remained of $3,290,678 against $2,846,837 for the six months ended June, 1921.

Railway Bonds on Market.—The Fletcher American Company, Indianapolis, has put on the market Gary Street Railway first mortgage 5 per cent bonds, due Oct. 1, 1937. The issue was authorized recently by the Public Service Commission. The bonds are being sold at 81 and accrued interest to yield about 7.10 per cent.

Issue Authorized.—The Interstate Commerce Commission on Aug. 11 authorized the issuance and sale of $550,000 of 4½ per cent bonds of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y. This issue was provided for in its mortgage and retained without issuance for the purpose of taking up the $550,000 of 6 per cent bonds.

Franchise Taxes Paid Under Protest.—Under protest the Washington Railway & Electric Company, Washington, D. C., has paid franchise taxes amounting to $247,808 for the year ended Dec. 31, 1921. The corporation counsel and the Washington Railway & Electric Company have not been able to agree on what constitutes the gross earnings of the company.

July Net $334,945.—For the month of July, 1922, the Brooklyn (N. Y.) Rapid Transit Company reports total operating revenues of $3,151,762, against $3,045,950 for July, 1921. Operating expenses increased from $1,950,480 in July, 1921, to $2,024,306 in July, 1922. The net income for the seventh month of this year was $334,945, against $288,570.

Abandonment Refused.—City Commissioners have refused the St. Johns Electric Company, St. Augustine, Fla., permission to suspend and abandon the operation of the trolley on the streets of the city and have instructed attorneys to protect the rights of the city under the franchise which they claim has been violated. The company has also been ordered to pay up for paving Central Avenue.

Refuses to Reopen Case.—The Indiana Public Service Commission has denied the petition of the city of Kokomo, Ind., for a reopening of the case in which the commission fixed a valuation on the property of the Indiana Railways & Light Company. At a hearing on the petition attorneys for the city contended that the valuation was too high. The valuation will be used for rate-making purposes.

Tracks Ordered Removed.—The tracks of the Tiffin & Fostoria line have been ordered removed from South Washington Street, Tiffin, by the City Council. The order is in the form of a resolution that "requests" the company to vacate the streets by April 1, 1923, and is preliminary to issuing bonds for the repair of the street. The tracks are only used for freight cars since discontinuance of city street car service there. Removing the tracks will force the company to move its freight depot, now at the south end of city.

Kansas Properties Reorganized.—The Kansas Electric Power Company, Lawrence, Kan., has been organized as the successor to the Kansas Electric Utilities Company, the Leavenworth Light, Heat & Power Company and the Bonner Electric & Manufacturing Company. It is controlled by the Consolidated Utilities Company. It owns all the capital stock of the Miami Valley Electric Company, Sidney, Ohio; the Union City (Ind.) Electric Company and the United Lighting Company of Albion, Pa. The Kansas Electric Power Company is operated by the Albert Emanuel Company, New York, N. Y. The following officers have been elected: President and general manager, Albert Emanuel, New York; vice-president, Victor Emanuel, New York; R. F. Rice, Lawrence; treasurer, C. B. Ziegler, New York; auditor, J. W. Pierce, Leavenworth; chief engineer, D. O. Vaughn, Leavenworth; managers, J. T. Skinner, Lawrence, and T. T. Parker, Emporia.

Traffic and Transportation

Discontinuance of Freight Facilities Results in Hardship

A petition has been presented to the Public Service Commission of Pennsylvania by the Allentown Chamber of Commerce asking that trolley freight service between Philadelphia and Allentown over the Philadelphia & Western and Lehigh Valley Transit Company be restored. Discontinuance of this service was allowed by the Public Service Commission on June 1 upon petition of the Philadelphia Rapid Transit Company, but loss of these facilities has not only resulted in the diversion of much freight from Philadelphia but is working a hardship among wholesale and retail dealers at Allentown, the Chamber of Commerce contends. Nearly all the fruit and produce for Allentown was shipped via the trolley lines, but since the service was discontinued many dealers are buying from the New York markets. A hearing on the matter will be given in the early fall.

Better Service Promised

General Superintendent Purinton of the Atlantic City & Shore Railroad Company has accepted the proposals submitted by Public Utility Commissioner Harry Bacharach to give Ventnor and Margate City better trolley service. Under the arrangement through service is to be established to Ventnor and Margate from the Inlet, Atlantic City, for the single 7-cent fare. The company will be permitted to continue a cut-off at Jackson Avenue, the boundary between Atlantic City and Ventnor, but will grant transfers whenever passengers desire to proceed farther south. More cars are also promised.

Residents of Ventnor City recently circulated petitions asking the Board of Public Utility Commissioners to probe the service and double fare of the Atlantic City & Shore Railroad, operators of the only trolley system on the island. Since last March Ventnor City and the railway management have been endeavoring to get together on some agreement that would give Ventnor adequate service.

Solves Problem by Operating Supplementary Bus Service

In an effort to put an end to the jitney problem in Tulsa the Tulsa (Okla.) Street Railway has put several passenger buses in operation as a supplement to its electric railway service. B. Hilburn, general manager of the company, who recently announced that in addition to the six 16-passenger buses received from Lima, he would purchase three more 25-passenger buses, said that the use of the buses was practical when co-ordinated with the railway. In a letter to the Public Utility Information Bureau he stressed the part that buses would play in future city transportation, but said that they would serve all interests best when operated in connection with the electric railways.

Jitney operation in Tulsa has been instrumental in retarding the progress of the railway property. This year the city administration agreed to eliminate jitney service on the East Sixth Street line and to eliminate a new bus line which paralleled the Kendall line of the Tulsa Railway for practically the entire length of the line. An arrangement was made whereby the Tulsa Street Railway was to operate buses on these lines, supplemental to its street car service, and on July 1 the company put into operation four twenty-five-passenger buses. On July 25 the company added one more twenty-five-passenger bus. These buses are operating on a schedule of nine minutes in the light part of the day, and seven minutes during the rush hours. By Oct. 1 the company expects to have sixteen passenger buses in service in Tulsa.

Duluth Case in Courts

Railway Authorized by Court to Charge Six-Cent Fare, but Must Issue Rebate Slips—Digest of Decision of Commission in the Rate Case Affecting the Duluth Street Railway

ALTHOUGH the Duluth (Minn.) Street Railway has been granted the right to collect a straight 6-cent fare by the Federal Court, it has been ordered by the same court to issue a rebate coupon for 5 cents with each six tickets purchased by a patron. The coupons are to be redeemable only in the event that the United States Supreme Court reverses the United States District Court's order granting the straight 6-cent fare. The company must be ready to comply with the rebate coupon order on Sept. 7, when it goes into effect.

The order for the rebate coupons was in the form of an amendment to the interlocutory injunction issued on July 31, placing the flat 6-cent rate in effect in Duluth on Aug. 1. City Attorney John B. Richards petitioned the court for the rebate coupons and Federal Judges Walter Sanborn, W. F. Booth and Martin J. Wade granted his application. The city is now preparing to appeal to the United States Supreme Court from the interlocutory injunction granting the 6-cent rate. The papers will be filed within a few days.

The original request was for an increase in fares from 5 to 7 cents, with four tokens for a quarter, but the order of the commission provided for a 6-cent fare and five tokens for a quarter. In obtaining an injunction, which the company now wishes to make permanent, it claims that a 6-cent fare, with five tokens for a quarter, will give no relief at all and would eventually cause the confiscation of its property.

The history of the case is reviewed by the commission in the decision which it handed down in passing upon the fare application. It is explained that pursuant to provisions of chapter 278 of the laws of 1921 the city of Duluth caused the property of the petitioner to be examined and appraised and submitted such appraisal as a part of the record in this case to the commission for its consideration. The representatives of the city and the company in many respects agreed upon the inventory and appraisal submitted. The property was appraised upon four different bases as follows:

Upon the cost of reproduction of the property based upon 1915 prices.

Upon the cost of reproduction of the property based upon the average of prices for ten years ending July 1, 1921.

Upon reproduction cost based on prices as of July 1, 1921, and

Upon a reproduction cost based upon units used in the actual construction of the property, or an investment basis.

The engineers representing the city and the company further agreed upon an inventory of the property and the appraisal, this inventory, so far as it affects all the physical property, excepting land, working capital, general overheads (engineering and superintendence, administration, organization and legal expenses), taxes during construction, interest during construction and cost of financing, development costs or going concern value, cost of power contract and accrued depreciation or present per cent condition of the property.

The agreed figures of the physical property, with the above exclusions, undepreciated, were as follows:

1915 prices, $3,488,161.
Ten year average, $4,864,437.
1921 costs, $6,308,966.
Reproduction or investment basis, $3,487,020.

The attitude of the commission was that these figures demonstrated that there had been an increase in replacement costs for this property, that at the present time all things were on a higher cost basis than that in existence during the period of construction of this property, and that there was an appreciation in value to be reflected in the final value for rate-making purposes.

The city and company also introduced figures to represent estimated cost of reproducing the property on the investment basis, or, in other words, to build up a figure to represent the original investment of the property as it exists at present. The city presented a total figure, undepreciated, of $4,504,638, while the company claimed $6,336,093. The investment account of the company, as of July 1, 1921, showed approximately $4,800,000.

According to the commission an analysis of the investment account showed that there was included therein money placed in the property in the early days of the company which had either been retired or had become obsolete, so that the present investment account contained the cost of certain items discussed by the commission under "Going concern value" and disallowed by the commission.

In connection with its claims the company set up a value of $150,735 for land. The city, through its assessor, placed a value on these lands of $118,094. The commission, however, found the fair value of the land to be $140,000.

GOING CONCERN AND OTHER ISSUES

The city and the company agreed upon the amount invested in materials and supplies to be $105,787. The balance of the working capital to be allowed was disputed, the company claiming $87,312 and the city allowing $24,213. Mr. Drum, the company's engineer, based his estimate upon an average of one-half month's current operating expenses and six months' capital expenses based on the year 1920. The one-half of capital expenditures amounted to $32,775. The attitude of the commission was that the company should be allowed $30,000 as a reasonable amount for working capital. The contention of the city was that as some of the general overheads were included in the unit prices, the balance of overheads should be less than 15 per cent. The company's engineer submitted specific amounts for each of the general overheads enumerated and not included in the original units used, his total varying from 18 to 20 per cent, depending upon basis of valuation.

After receiving the evidence the commission found that a reasonable allowance for general overheads was as follows:

> Engineering and superintendence, 5 per cent; administration, organization and legal expenses, 2 per cent; taxes during construction, 2 per cent; interest during construction, 5 per cent; or a total of 14 per cent on the physical inventory of the property for these items.

The company maintained that to the value of the property, including physical value, materials and supplies, general overhead and working capital, there should be added the sum of 5 per cent as a cost of financing. The city contended that the cost of financing should be considered in determining the rate of return. The attitude of the commission on this point was that, over a long period of years with changing relationships between stock issues and other security issues, the most practical method of providing for the cost of financing, in this case, was by giving due credit for such costs in the rate of return allowed upon the fair value of the property.

On the matter of going concern value the disposition of the commission was to recognize the principle that a utility in the determination of its fair value for rate-making purposes should have included what has been termed as going concern value. The company contended for an addition to the physical value of the present property sums aggregating $693,688 for expenditures or investments in property not now in existence. On this issue the commission said:

> It is a well-established practice, based on sound economics, that reserves should be established to provide for the replacement of property either destroyed or become obsolete due to development of the area. If the company failed to build up reserves from the so-called horse car period, which ended in 1890, any loss due to the change in the property should have been amortized in the immediately succeeding years. This statement also applies to each of the succeeding items claimed by the company. To capitalize such items at the present time would incorporate in the property a fictitious value, which has long since ceased to exist.

The commission quoted the famous Galveston case in connection with the claims made by the company for the cost of unifying the system and the loss of interest during operation. In analyzing all of these factors the commission found $500,000 to be a reasonable value to be added to the physical value of the property of the railway, in order to make said property an operating system.

VALUE FIXED AT $5,375,000

In summary, the commission found that the fair value of the property of the railway undepreciated, was $5,375,000.

The company arrived at a condition per cent of the property averaging for the four bases of value presented of 86.02 per cent, while the city used 83.57 per cent. The commission found that the present condition precentage of the property was approximately 83 per cent and that this condition per cent of the property, in order to arrive at the present value, should be applied to the items including physical plant, less lands and plus the general overheads allowed.

The commission found that as of July 1, 1921, the fair value of the property was $4,593,000, summarized as follows:

Physical property undepreciated..	$3,940,000
Excluding land—	
General overheads	550,000
Power contract	110,000
	$4,600,000
Depreciated value..............	$3,818,000
Lands	140,000
Working capital, materials and supplies	135,000
Going concern	500,000
	$4,593,000

The company contended for a rate of return not less than 8 per cent upon the fair value of the property as found by the commission. This claim was based upon expert testimony as to the going rate of interest and cost of financing of utility properties during the year 1921 experience and immediately preceding years.

The opinion of the commission was that the current rate of interest had materially declined and that a return of 7½ per cent was reasonable and would produce sufficient revenue to finance the company properly.

In determination of a rate of fare to be charged the commission found that there was a large class of riders who were the daily patrons of the company and produced a very large portion of the revenue. The remaining patrons of the company were transients within the city or individuals who rode occasionally. It was the opinion of the commission that the daily patrons and supporters of the railway who find it necessary to patronize the company going from their home to their work, should have as low a fare as is possible and still maintain the company in a position to furnish reasonable service. The commission therefore found that a 6-cent cash fare, together with tickets or tokens to be sold five for 25 cents, were just, fair and reasonable rates and would yield only a reasonable return upon the fair value of the property. In conclusion the commission said:

> Therefore, it is ordered, That the commission finds that the fair value of the property of the Duluth Street Railway within the city of Duluth, used and useful in giving service as of Dec. 31, 1921, is $4,599,978.
>
> Second, That the Duluth Street Railway is hereby authorized to change for its service in the transportation of passengers within the city of Duluth, 6 cents cash fare, and shall issue tickets or tokens good for rides on its said lines within the city of Duluth and charge therefor not to exceed 25 cents for five rides, effective Aug. 1, 1922.

Suspension of Increased Rates Ordered

The Public Service Commission has ordered a further suspension in the increased tariffs of passenger fares on the interurban and Niagara Falls and Lockport city lines of the International Railway, Buffalo, N. Y. The increases were to have gone into effect on Aug. 30. The tariffs thus further suspended provided for increasing the city fares in Niagara Falls and Lockport from 5 to 7 cents or four tokens for 25 cents; in Tonawanda and North Tonawanda to 10 cents, and the price of books for single-trip tickets between Niagara Falls and LaSalle would have been increased from $1 to $1.50.

Railway Transports Autos When Roads Are Bad

The Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has discontinued for the time being the "automobile ferry" service on the Lake Shore highway between Whitehouse, N. Y., through Ripley to a point east of the Twenty Mile Creek hill. According to the company the roads are now passable, but whenever they get in bad shape the railway puts flat cars in service to transport autos. The service was made available to motorists by the traction company at the request of the Erie (Pa.) Automobile Club.

The haul is about 6 miles and the charge is $5 for each machine regardless of size. The service is performed each way every hour. The railway uses a motor work car with a flat car attached and can handle four autos at one time. As many as thirty-one autos have been handled in one day.

Weekly Pass on Pacific Electric Railway

The weekly transferable pass for street car rides has been approved by the California Railroad Commission. The first tryout of the plan in California will be in the cities of Riverside and Pomona. The new form of fare, popularly known as a pass, will cost $1 and will entitle the holder to an unlimited number of rides during the seven-day period for which it is issued. By an order of the commission, the Pacific Electric Railway Company, Los Angeles, was authorized on Aug. 21 to put into effect such a fare in the cities named. The pass will be good for each week beginning Monday and ending the following Sunday.

In approving the system for Riverside and Pomona, the commission said:

> During the past few years the local street car lines of the Pacific Electric in Riverside and Pomona have not been making operating expenses, taxes and depreciation and part of the time the service has been conducted at an operating loss. The fare originally was 5 cents; this was increased to 6 cents several years ago, and on Jan. 1, 1921, the single fare was increased to 10 cents, with a special book of seven tickets for 50 cents. Under none of these fare schemes has the street car line been a financial success. If the present scheme does not produce sufficient revenue to continue operation of the lines, it would seem apparent that relief must be secured from other than the car rider, or the lines will eventually be abandoned. The railroad hopes there will be enough purchasers of the $1 weekly ticket to secure revenue to pay at least the operating expenses, taxes and depreciation.

Five-Cent Fare Last Resort

The municipal railway of Miami, Fla,. on Sept. 1 replaced the 10-cent fare that has been in force with a 5-cent fare. The decision to this effect was reached by the City Commission at its meeting on Aug. 29. The system has been operated at a loss for some time, and a weekly pass for $1.25 good for rides all week failed to bolster up the revenue. Mayor Leffler estimates that the 5-cent fare will triple the traffic.

The Miami Beach Electric Company, operating the railway from Miami to Miami Beach and run at a loss for several months, was granted at the same time a rental reduction for the use of the system and rolling stock owned by the city of Miami, the reduction being from $500 a month to $1 a month. During the winter the Miami Beach cars are well patronized, but the summer season finds them empty. This rental reduction will run from June 1, 1922, to July 1, 1923. It was reported that the deficit for the past four months has been $9,000. In addition the company has damage suits totaling $75,000 against it the outcome of which is uncertain. The cars are expected to maintain a ten-minute schedule.

Various means were suggested to relieve the situation before the present fare reduction and rental reduction were agreed upon, one of them being a rebate on the rental to be based on the monthly loss. It was pointed out by City Attorney A. J. Rose that this would not be legal since it would carry with it liability in the case of accident. At the same meeting a jitney ordinance was framed which will prohibit jitneys from takng on or discharging passengers within 50 ft. of the six main busy downtown street intersections. It is hoped that this will eliminate some of the jitney competition.

Records Prove Trainmen Are Careful

Indicating that their minds are on their work, trainmen of the Pacific Electric Railway, Los Angeles, Cal., during July, 1922, were subjected to 2,998 "surprise signal tests" and records show that 99.4 per cent of the tests made were observed and proper safety action taken. These tests are made as a safety measure for the purpose of determining whether or not trainmen are living up to rules and regulations governing the safe operation of trains. Without warning a train crew is confronted with or hears a safety signal in the form of fuses, torpedo, flag, lantern, switch light or interlocking signal. Tests checking the speed over intersections and within restricted speed limits are also made. In the event of failure to comply with existing instructions, the crew member who is delinquent in his duty is disciplined by demerits against his record, or dismissal may follow.

Reports of these tests are compiled monthly and record of test on each individual conductor and motorman is kept to date. By announcing the record of each division monthly keen rivalry is created. The tests made by the Pacific Electric are similar to those made on railroads throughout the United States and have been made by the company on its lines in southern California with increasing regularity since August, 1911.

D. W. Pontius, vice-president and general manager of the railway, was very proud of his company's record. He stated that in 1921 a total of 105,000,000 passengers were handled by the Pacific Electric without a single fatility and that to date in 1922 this record had been maintained.

Accident on Hudson & Manhattan Road

A rear-end collision on the Hudson & Manhattan Railroad on the morning of Aug. 31 is reported to have resulted in the injury to twenty passengers. The accident occurred on the tracks of the Pennsylvania Railroad at a point about a mile east of Manhattan Transfer near Newark, N. J., and at the drawbridge across the Passaic River. The leading train was forced to stop due to the opening of drawbridge and in the heavy fog the motorman of the second train failed to see his danger until too close to prevent the accident.

The rear car of the leading train and the forward car of the rear train were reported badly twisted and buckled. The steel construction undoubtedly was responsible for the small number of injured persons as the accident occurred just at the close of the morning rush hour.

Transportation News Notes

Will Improve Service.—As a result of a request of the West Norristown Improvement Association the Reading (Pa.) Transit Company, has agreed to improve its trolley service to Jeffersonville. Trolleys will now run between Norristown to Jeffersonville only, in addition to the other service.

Hearing on Lower Fare Concluded.—The hearing on half fares for school children travelling on the lines of the Georgia Railway & Power Company, Atlanta, Ga., has been concluded. Both sides namely, the City Council with the Board of Education and the Georgia Railway have been allowed thirty days for the filing of briefs.

Railway and Bus Rates the Same.—The Union Traction Company has announced a reduction in fares between Noblesville and Indianapolis and Carmel and Indianapolis. The fare for the round trip between Noblesville and Indianapolis has been cut from $1.44 to 90 cents, and the fare for the round trip between Carmel and Indianapolis has been reduced from 90 cents to 50 cents. The fares on the interurban are now the same as those the bus lines are charging.

Towers Prove Successful.—Due to the excellent results that have been obtained in controlling traffic from street towers in the more congested districts of downtown Atlanta, Frank Lee Butler, general operating manager of the Georgia Railway & Power Company, conferred recently with Mayor James L. Key advocating the construction of traffic towers at all of the important street intersections in the business district of the city. In some places the signal light system is used but it is operated by policemen who stand on the sidewalk, and it is believed that the construction of traffic towers will serve to increase the efficiency in controlling the congestion at these points.

Rerouting Changes Partly Approved.—While the Cincinnati (Ohio) Traction Company has accepted the rerouting ordinances recently passed in that city, it does not favor the arrangement in regard to certain lines, according to W. Kelsey Schoepf, president, who also said that the traction company accepted the ordinances to simplify matters. In a letter to the Council, Mr. Schoepf said that he hoped that body would again study the rerouting situation and repeal the ordinance affecting the Avondale, Winton Place and Auburn Avenue lines. The rerouting of these three lines around the Government Building, Mr. Schoepf said, would undo all the good and outweigh the saving anticipated to be made by the rerouting program as originally contemplated.

Personal Mention

Railway Man and Financier as Author

"It is the greatest book on wealth ever written. Beside it Adam Smith's 'Wealth of Nations' is mud." These are the characterizations applied by C. W. Barron, publisher of the *Wall Street Journal*, to the volume "The Things that Are Caesar's," written by a man well known to electric railway operators everywhere, but particularly well known to operators in the Central West. Mr. Barron is not loath to use strong words in editorials when the occasion demands, but the work of the author must, indeed, possess unusual merit to provoke such commendation.

The author of "The Things that Are Caesar's" is Guy Morrison Walker. Mr. Walker's interest in utilities is at present mostly academic, but he will be remembered as an operator of unusual ability and a financier who won a national reputation for himself largely through his handling of the Everett-Moore reorganization as special counsel and for his work in connection with the reorganization of the Columbus, Delaware & Marion Railway, Detroit & Toledo Short Line, the Pittsburgh Railway & Light Company and other properties. He has been a frequent contributor in the past to magazines and other publications on financial and economic topics, drawing his lessons largely from a fund of personal experience that has covered nearly all branches of finance.

One may or may not agree with the comparison made by Mr. Barron between "The Wealth of Nations" and "The Things that Are Caesar's," but there can be no doubting that Mr. Walker's experience as financier and journalist has been such as to make it well within the realm of reason that Mr. Barron's estimate is correct that Mr. Walker's book is the "clearest elementary presentation that has ever been written concerning the progress of the world and uplift of labor by capital and its earnings and accumulations."

H. O. Marler, J. A. Birmingham and E. H. Sharpe Advanced

On Aug. 1 H. O. Marler was appointed to the newly created position of assistant to O. A. Smith, passenger traffic manager of the Pacific Electric Railway, Los Angeles, Cal. Mr. Marler retains his former supervision of service and solicitation and assumes supervision of the passenger traffic department in the absence of Mr. Smith. Mr. Marler had previously acted in the capacity of general agent of the passenger department of the company.

At the same time J. A. Birmingham, traveling passenger agent, was appointed manager of motor bus service. This is a newly created position for the direct supervision of the several motor bus feeder lines recently installed in various cities by the company.

E. H. Sharpe, general agent of the passenger department, has been appointed special representative, executive department. A "bureau of news" has also been created, of which Mr. Sharpe will have charge.

Walter Shroyer Succeeds W. H. Forse

Walter Shroyer has been appointed treasurer of the Union Traction Company of Indiana, Anderson, to succeed W. H. Forse, who resigned on June 1. Mr. Shroyer has been auditor of the company since 1906.

This new treasurer has already made a wide record, for while he has been auditor of the Union Traction Company he has held several posts in railway organizations. In 1912 he was president of the Central Electric Railway Accountants' Association. This association does invaluable work in keeping railway accounting up to date, and the president of it must be on the *qui vive* every moment to know what others are doing, and in addition, to work out new things for them to do.

WALTER SHROYER

Mr. Shroyer also was a member of the executive council of the American Electric Railway Association for one year and has served on several other committees of the organization.

Since 1899 Mr. Shroyer has been with the Union Traction Company. His first title was cashier of the Muncie station, but it took no time at all for him to change this for the next higher, and the next, until in 1906 he was auditor of the company. On Aug. 15 came his recent promotion to the position of secretary.

Charles Gail is now superintendent of equipment of the Hamburg (N. Y.) Railway.

Mr. Shryock Promoted

E. O. Shryock has been appointed manager of the Zanesville street railway lines and the Zanesville Light, Heat & Power Company, according to an announcement on Aug. 25 by General Manager John S. Bleecker of the Columbus, Newark & Zanesville Electric Railway, Columbus, Ohio, which owns the Zanesville property. Mr. Shryock succeeds B. S. Watters, who resigned effective Sept. 1.

Mr. Shryock has been superintendent since June of this year. At that time he resigned as superintendent of railways of the Northeastern Ohio Railway & Power Company, Oak Harbor, Ohio. He had been with that company since 1913.

I. D. Brown is now claim agent of the Wichita Falls (Tex.) Traction Company, filling the post formerly held by A. W. Allen.

A. J. Mello has been appointed purchasing agent of the San Diego & Arizona Railway, San Diego, Cal., to fill the position formerly held by S. P. Howard.

W. W. Arnett is now commercial engineer of the Monongahela Power & Railway Company, Fairmont, W. Va. F. McQuillan formerly held this position.

C. H. Smith has been made superintendent of the Jackson city lines of the Michigan United Railways. He fills the post held formerly by J. A. Rosenberger.

W. M. Birkett, who has been assistant general manager of the Washington Water Power Company, Spokane, Wash., has been made general manager. W. E. Coman was formerly general manager and a vice-president of the company. R. A. Willson succeeds Mr. Birkett as assistant general manager. He had previously been superintendent of railway. C. R. Stiles is superintendent.

Obituary

Millard F. Skouden, superintendent of motive power at Anderson, Ind., for the Union Traction Company of Indiana, died recently. He had been ill for several weeks. Mr. Skouden had been connected with the traction company about twenty years and his record had attracted much attention. He started as a car repairer and would assist in scrubbing cars to get them out of the shops on time. His friends and former fellow employees are recalling how closely he studied all work to which he was assigned and also took technical courses during leisure hours. He was steadily promoted through various departments to the general offices and then was made the motive power superintendent, in charge of the motive power on more than 400 miles of track.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE
MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Priorities Announcement Made

Action Taken at Washington Considered of Much Importance to All Utilities —Output Outlook Bettered Materially—Details of Interstate Commerce Commission Ruling

OFFICIAL action considered of far-reaching importance to the country's public utilities was taken on Aug. 29 when the Interstate Commerce Commission issued amendment No. 4 to service order No. 23, which restricts Class 1 priorities on coal to such extraordinary cases as may be designated from time to time by the commission. Coal intended for emergency uses generally is included in Class 2 priority. Owing to the limited time during which lake transportation will be available, shipments of certain coal for the Northwest to the lower lake ports will be made under Class 1 priorities. As amended service order No. 23 now provides for priorities as follows:

> That in the supply of cars to mines upon the lines of any coal-loading carrier, such carrier is hereby authorized and directed to place, furnish, and assign such coal mines with cars suitable for the loading and transportation of coal in succession as may be required for the following classes of purposes, and in the following order of classes:
>
> Class 1. For such special purposes as may from time to time be specially designated by the commission or its agent therefor. In designating special purposes under this reservation, the commission or its agent will designate the class of relative priority which such special purpose or particular shipment or shipments shall receive.
>
> Class 2. For fuel for railroads and other common carriers, and for bunkering ships and vessels; for public utilities which directly serve the general public under a franchise therefor, with street and interurban railways, electric power and light, gas, water and sewer works, ice plants which directly serve the public generally with ice, or supply refrigeration for human foodstuffs; hospitals; for the manufacture and production of foodstuffs and medicines, and for the manufacture of containers therefor; for the United States, state, county or municipal governments, and for their hospitals, schools, and other public institutions—all to the end that the foregoing may be kept supplied with coal for current use for such purposes, but not for storage, exchange or sale; for bituminous coal consigned to a pool or pools of lake cargo or bunkerage coal at any port upon Lake Erie for trans-shipment by water to ports above Lake Erie; bituminous or anthracite coal or coke for household use and for the heating of buildings. It is not intended by this paragraph to give any priority as between the classes of persons and uses mentioned herein.
>
> Class 3. Other purposes.
>
> No coal embraced in classes one or two shall be subject to reconsignment or diversion except for some purpose in the same class or a superior class in the order of priority herein prescribed.

The immediate administration of the priorities was vested in agents of the commission as follows: John C. Roth, E. H. Degroot, Frank C. Smith, S. J. Mayhood, B. S. Robertson, C. C. Semple, W. L. Barry, O. S. Reynolds, H. M. Priest, J. B. Ford, John T. Marchand, J. A. Emmart, W. L. Lloyd, A. R. Layman, Delvert Garman, F. F. Engles, L. P. Green, T. L. Stevens, C. J. Bailey, C. D. Thomas, W. S. Rice, W. D. Anderson, W. B. Moore, J. Patterson, J. F. Stewart, John E. Barr, William J. Kiniry, T. J. Davis, T. F. Sullivan. The three agents named first are the director, the assistant director and the chief inspector of the Bureau of Service of the Interstate Commerce Commission.

The issuance of this amendment brings the situation back to that which existed when J. W. Lieb issued his first circular to the public utilities. It is expected to correct the evils arising under federal fuel distribution which was cutting off a large number of public utilities from their regular fuel supply, leaving them in an emergency class and compelling them to buy coal at prices greatly in excess of their contracts.

Reports reaching Washington indicate that the public utilities are getting their share of the increased volume of coal being produced, but owing to the fact that reserves have been so generally used up, the situation of large number of public utilities will continue to be serious for some weeks to come, particularly since they are not allowed to build up stocks and because of the uncertainty of transportation.

Coal Age says that as production increases with mines opening under the Cleveland wage agreement more coal is beginning to flow in its accustomed grooves. Much of the output is still going on priority orders, but the heavier production has permitted contract shippers to again supply some of their regular trade. Additional production of mines opening up under the Cleveland agreement has caused a sharp upturn to the daily output. According to the Geological Survey, an output of at least 6,000,000 tons for last week (Aug. 21-26) is assured by early reports, and additional tonnage from other districts that are known to have signed the agreement may raise the total to 6,250,000 tons.

£509,258 Profit for British T-H. Company

The report of directors of the British Thomson-Houston Company for 1921 shows that the profits were £509,258. Dividends of 7 per cent on the preference shares and 6 per cent on the ordinary shares were declared. H. C. Levis, chairman of the company, stated at the annual meeting on May 30 that the output in 1921 was the greatest in the history of the company. Notwithstanding the general depression throughout the country, the volume of orders received by the company this year to date was over 37 per cent in excess of the orders received for the corresponding period of 1921. The company now has on hand orders to the value of over £2,250,000. A day or two after the meeting particulars were announced of an issue being placed privately of 7 per cent preference shares of the company.

ELECTRIC RAILWAY MATERIAL PRICES—AUGUST 29, 1922

Metals—New York

Copper, electrolytic, cents per lb	13.875
Lead, cents per lb	5.90
Nickel, cents per lb	39.00
Zinc, cents per lb	6.575
Tin, Straits, cents per lb	32.375
Aluminum, 98 to 99 per cent, cents per lb	19.10
Babbitt metal, warehouse, cents per lb.:	
Fair grade	24.50
Commercial	11.125

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$9.00
Somerset mine run, Boston	6.00
Pittsburgh mine run, Pittsburgh	....
Franklin, Ill., screenings, Chicago	4.25
Central, Ill., screenings, Chicago	4.45
Kansas Screenings, Kansas City	2.875

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$38.00
Standard open hearth rails, gross ton	$38.00
Railroad spikes, drive, Pittsburgh base, cents per lb	2.75
Tie plates (flat type), cents per lb	2.25
Angle bars, cents per lb	2.40
Rail bolts and nuts, Pittsburgh base, cents, lb.	3.625
Steel bars, cents per lb	2.625
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	1.35

Hardware—Pittsburgh

Wire nails, base per keg	2.50
Sheet iron, (24 gage), cents per lb	4.375
Sheet iron, galvanized, (24 gage), cents per lb	5.025
Galvanized barbed wire, cents per lb	3.10
Galvanized wire, ordinary, cents per lb	2.80

Waste—New York

Waste, wool, cents per lb	15.00
Waste, cotton, (100 lb. bale), cents per lb.:	
White	14.00
Colored	12.00

Paints, Putty and Glass—New York

Linseed oil, (5 bbl. lots), cents per gal	91.50
White lead, (100 lb. keg), cents per lb	12.50
Turpentine, (bbl. lots), per gal	$1.235
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength, all sizes, A quality), discount*	85.0%
Putty, 5 lb. tins, cents per lb	5.50

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb	15.625
Rubber-covered wire, cents per lb	6.05
Weatherproof wire base, cents per lb	16.00

Paving Materials

Paving stone, granite, 4 x 8 x 4, f.o.b. Chicago, dressed, per sq.yd	$3.20
Common, per sq.yd	3.00
Wood block paving 3½, 16 treatment, N. Y., per sq.yd	2.17
Paving brick, 3½ x 8½ x 4, N. Y. per 1,000 in carload lots	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd	1.75
Cement, Chicago consumers net prices, without bags	2.05
Gravel, ¾-in., cu.yd., N. Y	1.75
Sand, cu.yd., N. Y	1.00

Old Metals—New York

Heavy copper, cents per lb	9.37½
Light copper, cents per lb	9.25
Heavy brass, cents per lb	6.25
Zinc, old scrap, cents per lb	3.25
Yellow brass, cents per lb (heavy)	6.50
Lead, heavy, cents per lb	4.50
Steel car axles, Chicago, net ton	$18.75
Old car wheels, Chicago, gross ton	22 75
Rails (short), Chicago, gross ton	13 75
Rails (relaying), Chicago, gross ton	25 00
Machine turnings, Chicago, net ton	10 25

Some time ago the International General Electric Company, New York, accepted from the British Thomson-Houston Company 7 per cent (tax free) preference shares to the amount of £1,500,000 in settlement of outstanding liabilities in the form of notes, and it was 1,000,000 of these shares which were now being resold. They were placed privately on the basis of 19s. 6d. per share.

Nine-Story Addition to Ticket Plant

The Globe Ticket Company, Twelfth and Appletree Streets, Philadelphia, has purchased adjoining properties on Twelfth Street and Cherry Street and has had plans drawn for a nine-story addition to its present eight-story structure. It is expected ground will be broken in October.

The company reports the plant working at capacity, with an annual output of more than 5,000,000,000 theater and trolley tickets and transfers.

The company recently completed an order for 500,000,000 tickets for one trolley company, which immediately ordered an additional 50,000,000. Another public utility company receives three carloads of tickets from the Globe company each month. It is also working on an order for 100,000,000 transfers for a Mid-West electric railway.

Street railway and trolley tickets printed at the Philadelphia plant are used in virtually all countries of South America, in Porto Rica, the Philippine Islands, Cuba and the British West Indies. Recently an order for both classes of tickets was filled for Shanghai, China.

Track and Roadway

Shenango Valley Traction Company, Youngstown, Ohio, has about completed the laying of a double-track car line between Sharon and Farrell.

Rochester & Syracuse Railroad, Syracuse, N. Y., is preparing to lay new tracks along its route in Lyons, N. Y. New poles have already been put up.

Northern Texas Traction Company, Fort Worth, Tex., has begun work on the extension on Bowie Street from Hemphill to South Adams. Petition for an injunction to restrain the company from building this line was denied by Judge R. E. L. Ray.

New York, N. Y., Transit Commission has directed its chief engineer to prepare plans and form of contract for the construction of an extension of the Fourth Avenue subway in Brooklyn from its present terminus at Eighty-sixth Street to Fort Hamilton. The project, including the Brooklyn extension, the tunnel and a supplemental ferry run will cost about $20,000,000.

Cincinnati, Ohio.—Change in the plans for the Cincinnati extension of the Rushville line of the Indianapolis & Cincinnati Traction Company, which would give the line an entrance to Cincinnati by way of College Hill on the north instead of Miamitown on the west, as originally proposed, has been announced by C. L. Henry, president of the road. The new route, Mr. Henry says, will effect a big saving for the company, as an entrance through Miamitown would necessitate the building of a high grade crossing because of the nature of the territory in that section. The proposed extension is the major element in a $4,000,000 development project, which calls for the building of 64 miles of main line, in addition to the necessary spurs, between Rushville and College Hill and the equipment of the system for direct-current operation.

Rolling Stock

Wisconsin Public Service Company, Green Bay, Wis., recently ordered five interurban cars from the St. Louis Car Company. It was incorrectly stated in the Aug. 26 issue of these columns that the Eastern Wisconsin Electric Company had placed such an order. This company is considering the purchase of a like number of cars but has not yet placed its order.

The Dayton & Troy Electric Railway, Dayton, Ohio, has purchased from the City Railway of Dayton, ten single-truck cars which are being converted into one-man cars operating on the pay-as-you-enter and leave-by-rear-door method. The new material required for the rehabilitation of these cars has already been received and four of the cars are now being operated.

Chicago Surface Lines has placed an order with the General Electric Company for 366 type 275, 60-hp. motors. This is a new design which permits standardizing on one motor for both the one-man and the two-man motor cars now under construction in the shops of the railway company. The 45 double-truck, one-man safety cars will be equipped with two of these motors mounted on maximum traction trucks, giving 120 hp. per car. The 69 double-truck, two-man standard double-end "Chicago" cars will be equipped with four motors each, or 240 hp. per car. The original plan was to equip only four of these two-man cars with motor capacity sufficient for hauling trailers. The four G.E. 275 motors will now equip all 69 cars for hauling trailers in all-day service. This type of motor made this possible without increasing the cost or the weight. While only four are needed for hauling trailers now, the others will be available at any time for that duty by simply installing couplers. It is expected that the smaller number of slower speed motors on the safety cars will result in decreased maintenance cost. Although two of these motors are lighter than four of the smaller safety car motors, there will be no saving in gross weight on account of the heavier weight of the maximum traction trucks. The new motor is said to embody the latest developments and it weighs about 2,200 lb.

Power Houses, Shops and Buildings

Rochester & Syracuse Railroad, Syracuse, N. Y., will erect a new and up-to-date trolley station and freight office on Geneva Street, Lyons.

The South Covington & Cincinnati Street Railway, Newport, Ky., suffered damage to its emergency powerhouse by an explosion on Aug. 16, which was attributed to a "pocket" of gas under one of the boilers. The explosion was followed by fire. William H. Harton, general manager, said that the damage would not exceed $10,000. The operation of cars was not interrupted.

Olean, Bradford & Salamanca Railway, Olean, N. Y., is negotiating with the Niagara, Lockport & Ontario Power Company of Lockport, N. Y., for the purpose of contracting for sufficient power amply to provide for the needs of all its local lines. If the company is successful in its negotiations it will be possible either to supplement its present power supply or it may entirely shut down its own power station and purchase all the power to handle the heavy freight and passenger service which the railway company is now struggling to maintain with its own power sation.

Trade Notes

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order from the Union Electric Light & Power Company of Illinois for a 35,300-kva. turbine-generator unit for its new plant in St. Clair County. The plant, known as the Cahokia Power Plant, is being designed by McClellan & Junkersfeld, Inc., of New York City.

R. S. Frehse has been made assistant to Oscar A. Broten, Western representative of the National Pneumatic Company, Chicago. Mr. Frehse has been connected with the sales department of the Chicago Railway Signal Supply Company for the past five years. He is twenty-six years old and a graduate of the University of Wisconsin. The National Pneumatic Company has moved its Chicago office from the Edison Building to 940 McCormick Building.

New Advertising Literature

Roller-Smith Company, New York. N. Y., has issued Bulletin No. 250, describing and illustrating a new device known as the portable direct-current galvanometer Types LGD and KGD.

General Electric Company, Schenectady, N. Y., has issued a sixty-page bulletin No. 48,028 entitled "Electrically Operated Pumps." The bulletin shows the feasibility of applying electric motors for driving pumps of all kinds and contains a complete list of engineering tables compiled to help the installation of electrically operated pumps.

Safety Brakes *for* *Safety Cars*

PEACOCK
Staffless Brakes

Designed in the first stages of safety car development with special reference to the unusually high ratio of live load weight carried by these little cars. Fast in action as well as of ample chain winding capacity, Peacock Staffless Brakes are, moreover the most powerful hand-brakes that you can put on your safety cars.

Roads with technical experts and facilities for studying braking problems, specify Peacock Staffless Brakes for all their safety cars.

No matter how reliable and satisfactory the air brakes are, hand brakes for possible emergencies are always required. And the best is never too good, for emergency equipment.

Every Peacock Brake is a Safety Brake

NATIONAL BRAKE COMPANY, INC.

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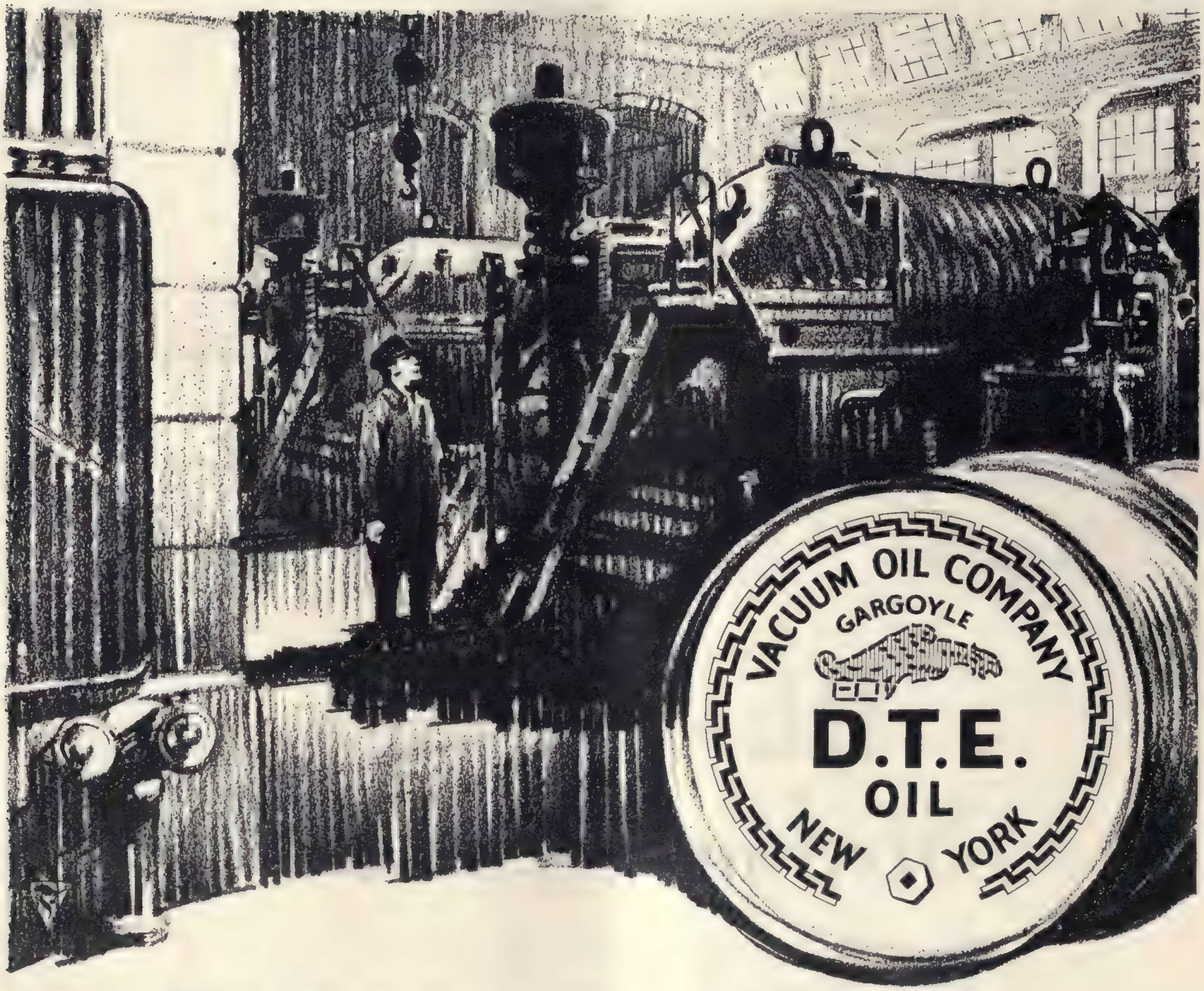
Canadian Representative, Lyman Tube & Supply Co., Montreal, Can.



Help your turbine "grab the load"

WHEN the call comes for more "juice," is your turbine always ready to meet it?

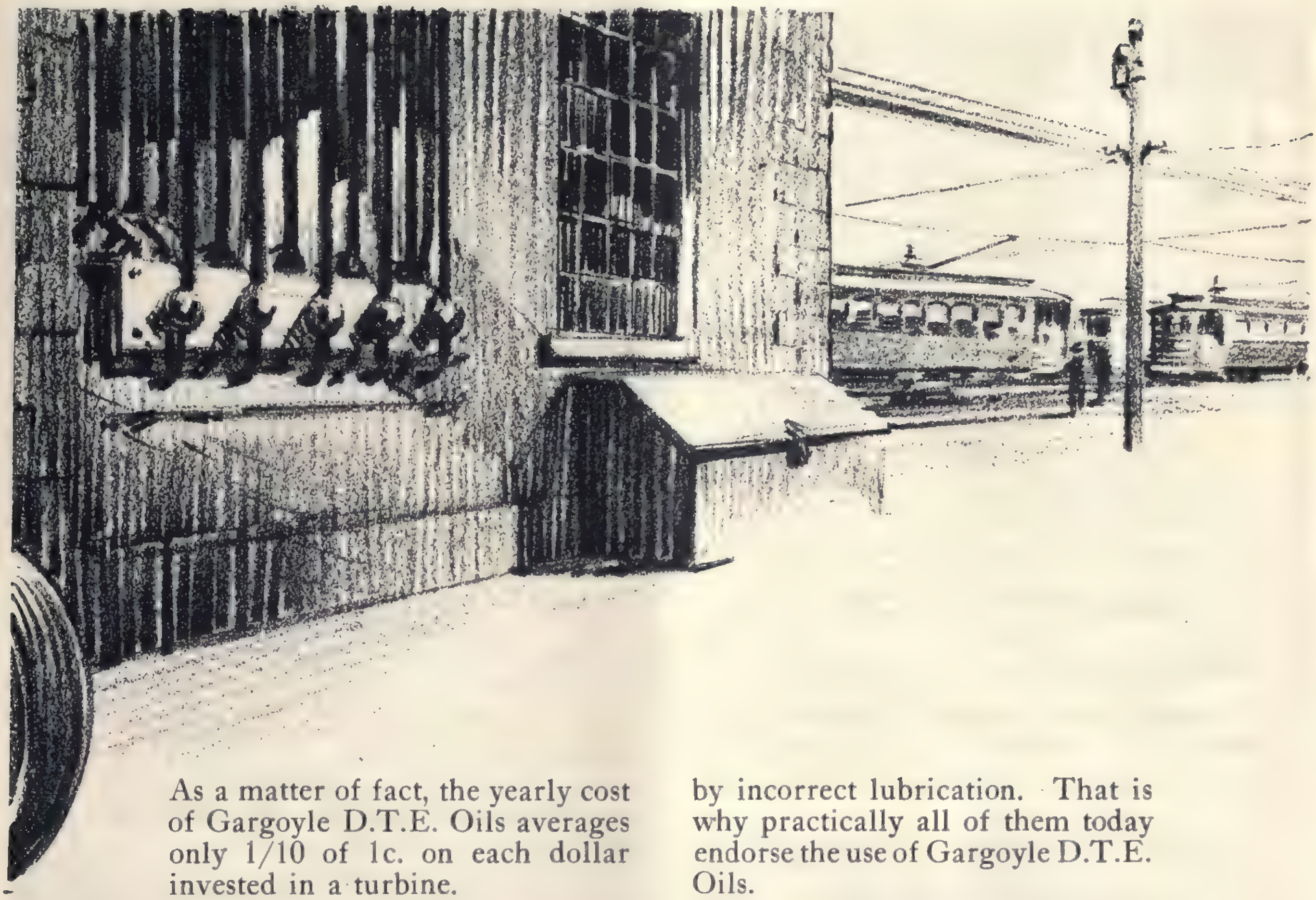
A power plant crippled even temporarily slows down both cars and profits. You appreciate that fact, of course.

But possibly you may not realize this.

Turbines are extremely sensitive to incorrect lubrication. Oils that will not separate readily from water or other impurities promote the formation of sludge—the bane of every turbine operator. Sludge is responsible for more shutdowns than is generally realized. The operator of a large power station recently said:

"We figure it costs us $200 an hour when one of our turbines is out of service, and it generally takes about twenty-four hours to clean up a turbine circulation system. Dependable turbine oil would be cheap at $5 a gallon."

VACUUM OIL COMPANY



As a matter of fact, the yearly cost of Gargoyle D.T.E. Oils averages only 1/10 of 1c. on each dollar invested in a turbine.

Gargoyle D.T.E. Oils are manufactured from the highest grade of crudes and are especially treated to meet the exacting requirements of turbine lubrication.

Gargoyle D.T.E. Oils, if properly used, will not form sludge.

Turbine manufacturers know the danger, bother and expense caused by incorrect lubrication. That is why practically all of them today endorse the use of Gargoyle D.T.E. Oils.

The correct lubrication of turbines has been one of the outstanding successes of the Vacuum Oil Company. We would like to put before you the records of our results. They will show how we can cooperate with you in reducing your turbine troubles to a minimum. In writing, kindly address our nearest branch.

GARGOYLE

Lubricating Oils

A grade for each type of service

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CORRUGATED METAL CULVERTS

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The nestable construction which makes "ACMES" so easy to ship, handle and haul also makes installing a simple matter. Two men can easily install even the 60-inch and 72-inch diameters. One section is simply placed on top of another and bolted together through matching bolt holes (galvanzied bolts furnished). In places where full circle culverts are hard to install, "ACMES" are conveniently and economically handled. They can be set up section by section (break joint construction—no joining bands necessary). Once assembled, they can never become disjointed. Thousands now in use. Write for catalog M-21.

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GUARANTEED
One-Half Inch
PENETRATION

This Disc and
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This Metal disc is countersunk on the butt-end of every pole Butt-Treated by the *"P & H"* Guaranteed Penetration Process.

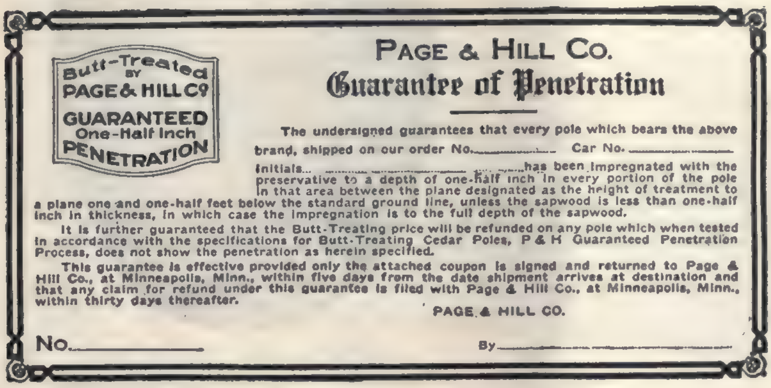
It is your protection against substitutes. It is your assurance of the guaranteed half inch uniform depth of penetration.

Behind this disc is the reputation of the Page and Hill Co., and their 20 years of reliable, dependable service in the pole industry.

The photograph on the left is an untreated pole. Note the decay at ground line.

PAGE &
MINNEAPOLIS, MINN.

Protected Poles



Butt-Treated
BY
PAGE & HILL Co
GUARANTEED
One-Half Inch
PENETRATION

PAGE & HILL CO.

Guarantee of Penetration

The undersigned guarantees that every pole which bears the above brand, shipped on our order No.________ Car No.________ Initials________ has been impregnated with the preservative to a depth of one-half inch in every portion of the pole in that area between the plane designated as the height of treatment to a plane one and one-half feet below the standard ground line, unless the sapwood is less than one-half inch in thickness, in which case the impregnation is to the full depth of the sapwood.

It is further guaranteed that the Butt-Treating price will be refunded on any pole which when tested in accordance with the specifications for Butt-Treating Cedar Poles, P & H Guaranteed Penetration Process, does not show the penetration as herein specified.

This guarantee is effective provided only the attached coupon is signed and returned to Page & Hill Co., at Minneapolis, Minn., within five days from the date shipment arrives at destination and that any claim for refund under this guarantee is filed with Page & Hill Co., at Minneapolis, Minn., within thirty days thereafter.

PAGE & HILL CO.

No.________ By____________

this Guarantee Safe Guard

The guarantee speaks for itself:

"It is further guaranteed that the Butt-Treating price will be refunded on any pole which when tested, in accordance with the specifications for Butt-Treating Cedar Poles, *"P & H"* Guaranteed Penetration Process, does not show the penetration as herein specified."

We are originators of the *"P & H"* Guaranteed Penetration Process. Producers, manufacturers and foremost in the Butt-Treatment of Cedar Poles. Particulars on request.

The photograph on the right is a Butt-Treated Pole. Note the sound condition at ground line.

HILL CO.

50 Church St., New York, N. Y.
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VERNE LEROY HAVENS
Editor of Ingeniería Internacional

"You might do this for us, Mr. Havens"

"We wrote you July 1st in reference to a sale of pumps to the contracting firm of......................in Rio de Janeiro. We note in your letter of July 30th that your editor, Mr. Havens, is to be in Rio in connection with the Brazil celebration and convention of engineers and we would be very pleased to accept your kind offer of Mr. Havens' services in this connection. If it is not asking too much we would like to have Mr. Havens make a good-will or sort of follow-up call on our new customer. What we would particularly like to know is whether the shipment arrived O.K. and whether any difficulty has been met in getting the pumps set up and in operation. We also . . . "

The rest of the letter is of a more confidential nature. This gives you an idea, though, of the kind of service Mr. Havens can give to American manufacturers during his more than three months' visit in Brazil, Argentina and Uruguay in connection with the International Engineering Congress and the Brazilian Centennial Exposition. These two important events open in September in Rio de Janeiro.

Mr. Havens sailed August 5th, but it is not too late to get word to him in case you can accept our complimentary offer of his services. Advise us how he can help you and we will cable him to be your missionary.

Note: This is one of Mr. Havens' many trips to South America and in placing his services at your disposal "Ingeniería Internacional" is only rendering another of its many helps to American manufacturers interested in Latin-American markets.

An Engineer
An Economist

Mr. Havens has been editor-in-chief of "Ingeniería Internacional" since its inception nearly four years ago. He has made many important market investigations for the U. S. Department of Commerce and is well known in South American financial and engineering circles. High lights of his South American experiences are:

1905—Div. Eng., heavy mountain construction, Mexican Central R. R. 1906—Asst. Eng., Mexican Light & Power Co. 1907—Reconstructed down-town section of Havana Electric Ry. 1908-11—Chief Eng., Mexico Light & Power Co., Mexico Tramways Co., Mexico Steel & Chemical Co., Pachuca Irrigation & Power Co. 1913-14—General consultation work; reports for financing railways in South America; investigations of economic conditions. 1915-17—Commercial Attaché to American Embassy, Santiago, Chile.

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Send MITTEN-TRAYLOR buses to your peak load points and let them gather in the overflow crowd your cars can't carry.

In the evenings route your MITTEN-TRAYLOR bus unit, filled with pleasure riding patrons, through the parks and shaded drives.

After midnight let your MITTEN-TRAYLOR unit carry the night riders. Send your "owl cars" to the barn and shut down your powerhouse.

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They are real passenger carrying automobiles. They attract patrons, and more patrons mean more revenue.

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CONDUCTIVITY

U. S. Bureau of Standards (1913-1915), see Technologic Bulletin No. 62.

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STRENGTH

Robert W. Hunt & Co. Testing Laboratories (1914-1916).

"*Greater Strength* and *Less Deflection*, thru Joint, than the unbroken rail."

ENDURANCE

Over 200 Properties (1912-1922). "Field Test, and actual service, thru Seasons, successfully resist severe traffic and temperature strains and stresses, as well as corrosion and electrolytic action." Joints "INTACT" after ten (10) years' severe service.

FAILURE OF WELDED TRACK

Not to exceed 1% of "Breakages," attributed to "Indianapolis" welded Joints, when applied in accordance with manufacturer's instructions. (Many report none (0%).)

ECONOMICAL

Cost less than Bolted Splices and Bonds.

AVAILABLE

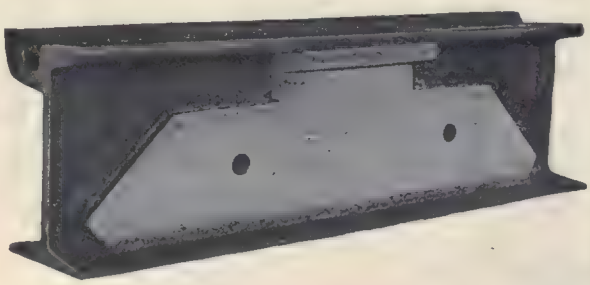
Any road, Any quantity, from one (1) to ten thousand (10,000).

UNIVERSAL

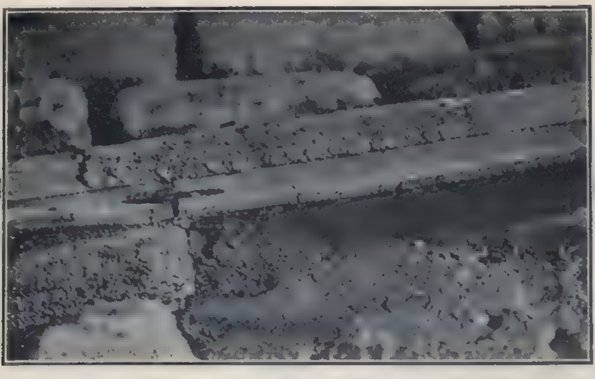
Any Rail Section, Suitable for paved streets.

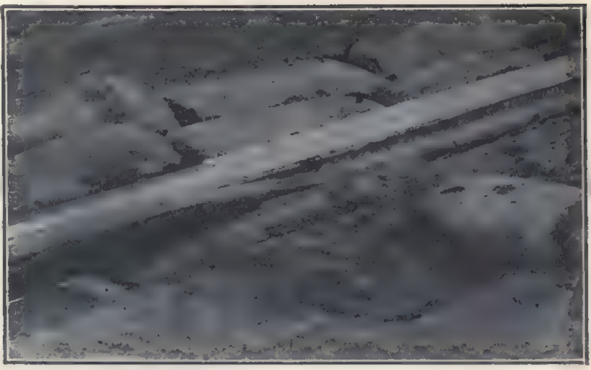
DEPENDABLE

PROVEN, thru Ten (10) years, under varying conditions, in diversified territory (50 states and countries) over 200 properties, on over 125 different rail sections.



INDIANAPOLIS SWITCH AND FROG COMPANY
Springfield, Ohio





Smooth as an unbroken rail

Every Joint should be kept up

AJAX
Electric Arc Welders
UNIVERSAL
Rotary Track Grinders
ATLAS
Rail Grinders
RECIPROCATING
Track Grinders

Save big losses later on by spending a little bit judiciously now. It costs but a trifle to keep joints up by welding and grinding before they get too bad.

Every low joint, every rough spot, is a source of constantly increasing loss. With each passing wheel, the track structure suffers another hammering blow. These shocks are transmitted to the wheels and trucks of the car and into the car body itself. In addition to the destructive effect on the physical property, passengers become displeased and shun the railway service.

Our welding and grinding equipment is now widely used by managements which have investigated the true sources of economy in track maintenance.

Let us go into this further with you

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

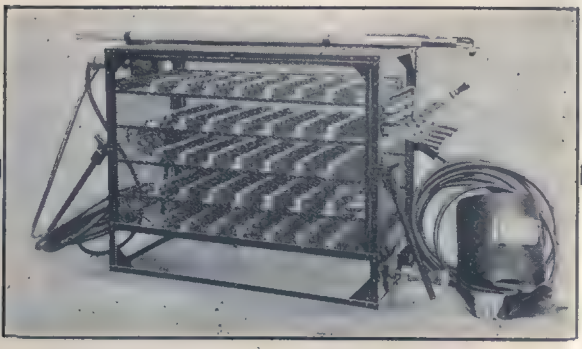
AGENTS:

Chas. N. Wood Co.
Boston

Electrical Engineering & Mfg. Co.
Pittsburgh

Atlas Railway Supply Co.
Chicago

P. N. Wood
New Orleans



"Ajax"

"Atlas"

Knock $6,000 a mile off you

Low Cost
to Install
No Cost
to Maintain

BRIEFLY, the ties are attached to the rails—rails blocked to lever—and concrete is poured exactly as in ordinary paving.

Dayton Resilient Ties form a rigid, reinforced concrete bed. Yet each tie rests on its own highly resilient cushion of asphalt under the wooden-block rail support. A special form of joint-tie insures against low and uneven joints.

DAYTON

track construction estimates

and specify permanent and economical construction

THE SCIENCE of track engineering is nothing more than the correct application of certain fundamental principles to track construction at a cost that makes the outlay justify the layout.

The outstanding feature of Dayton Mechanical Ties—*Resiliency*—is the application of such a principle.

The cushion feature allows just the right amount of rail deflection to absorb the shocks that sooner or later pulverize the concrete, crystalize the steel and rack the rolling stock to pieces.

Dayton Mechanical Ties will moreover save you $6000 a mile over wood ties, laid in concrete.

If you are interested in a quiet, durable track with no comeback, drop us a card today and we'll be glad to send you complete information.

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

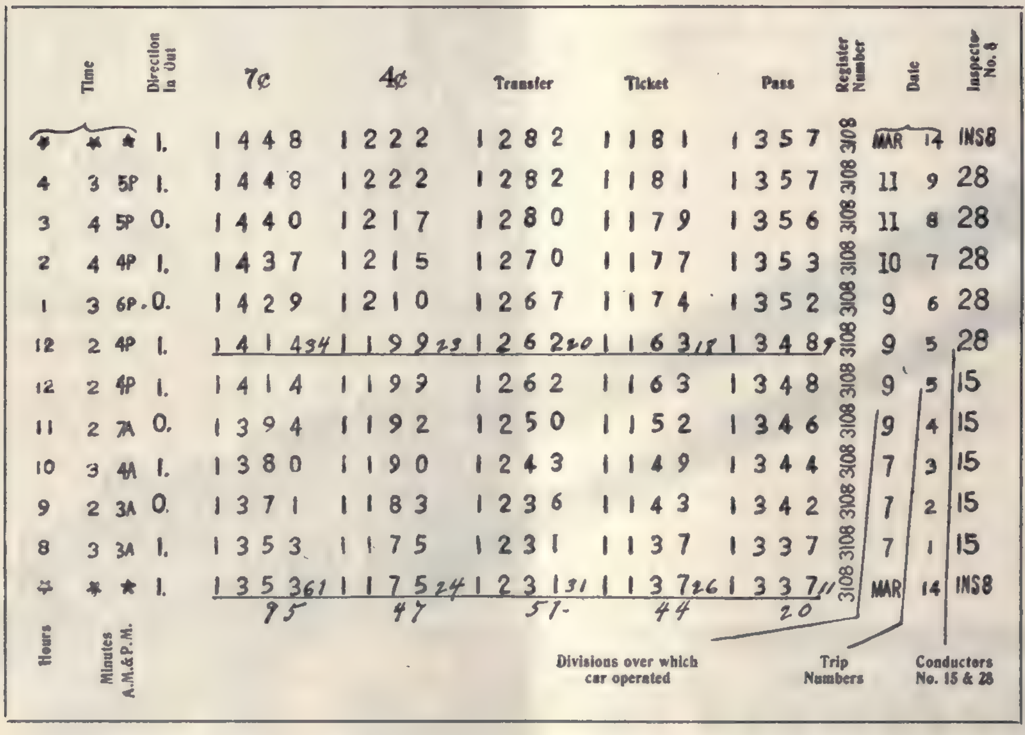
Resilient TIE

They Cushion
the Shock on
the Rolling Stock

MERCHANDISE YOUR TRANSPORTATION

The use of Ohmer Fare Registers on your cars will enable you to merchandise your transportation with the full co-operation of your conductors.

Your sales will be handled in the same manner in which retail sales of any commodity are successfully treated, by making the salesmen responsible and controlling the sale by a clear registration of the amount.



Time Hours	 Minutes	 A.M.&P.M.	Direction In Out	7¢	4¢	Transfer	Ticket	Pass	Register Number	Date		Inspector No. 8
✱	✱	★	I.	1448	1222	1282	1181	1357	3108	MAR	14	INS8
4	3	5P	I.	1448	1222	1282	1181	1357	3108	11	9	28
3	4	5P	O.	1440	1217	1280	1179	1356	3108	11	8	28
2	4	4P	I.	1437	1215	1270	1177	1353	3108	10	7	28
1	3	6P	O.	1429	1210	1267	1174	1352	3108	9	6	28
12	2	4P	I.	1414 34	1199 23	1262 20	1163 18	1348 9	3108	9	5	28
12	2	4P	I.	1414	1199	1262	1163	1348	3108	9	5	15
11	2	7A	O.	1394	1192	1250	1152	1346	3108	9	4	15
10	3	4A	I.	1380	1190	1243	1149	1344	3108	7	3	15
9	2	3A	O.	1371	1183	1236	1143	1342	3108	7	2	15
8	3	3A	I.	1353	1175	1231	1137	1337	3108	7	1	15
✱	✱	★	I.	1353 61	1175 24	1231 31	1137 26	1337 11	3108	MAR	14	INS8
				95	47	51-	44	20				

Divisions over which car operated

Trip Numbers

Conductors No. 15 & 28

OHMER FARE REGISTER CO.

Dayton, Ohio

MERITAS
LEATHER CLOTH

The Leading Leather Substitute

Endured What Ruined Eight Others

For a year samples of Meritas and eight other leather cloths have been exposed to the weather on the roof of one of our factories.

On the eight, the sun sweated out the non-drying oils, and after the rain washed the sticky oils away the surface was left dry and brittle, to crack and peel under the cold winds. The coatings can be chipped off now with the finger nail, the luster and embossing are gone.

The Meritas Leather Cloth still retains its embossing, is still pliant and resilient, the coating is uncracked and lustrous.

We will be glad to show you the nine samples. We will also be glad to send you samples of Meritas Leather Cloth, suitable for your specific requirements, with which you can do your own experimenting.

Meritas is made in every weight, grain, color and finish you will require.

THE STANDARD TEXTILE PRODUCTS CO.
320 BROADWAY, NEW YORK

MERITAS
STANDARD
STP
TEXTILE PRODUCTS CO
BRAND
REG US PAT OFFICE

The Heat Test

Hold a lighted match under corner of Meritas Leather Cloth. Notice there is no rim of free oil preceding flame. There is no non-drying oil in Meritas to come to the surface, get sticky or stain clothes. Try this on other materials and see what happens.

The Abrasion Test

Rub the edge of a coin across the surface of Meritas Leather Cloth. Press hard. Do it repeatedly. No surface coating comes off and very little impression is made on the embossing. Try this on other goods and prove for yourself which stands the hardest wear.

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier
INCORPORATED
CANDLER BLDG NEW YORK

COLUMBIA
FORGINGS

Brake and Truck Parts

A forge shop with the most modern and efficient machinery is available to meet promptly your requirements. Equipped with bull dozers, forging and upsetting machines, steam hammers, drop hammers, Bradley hammers and hand forges. Can handle any kind of work up to 8 inches diameter, or up to 16 inches diameter in lengths not exceeding four feet.

Our forge shop has on hand die equipment for making equalizer bars, brake rigging in all its details, motor suspension bars, and all the drop forgings used in the electric railway field. We make a specialty of development work on special parts. Simply send us a sketch and we can take in hand the entire job from the design of the dies to the finished forging, rough or machined.

Where customer furnishes specifications, we undertake to meet them accurately and completely, both as to quality, chemical and physical properties of the steel used, and dimensions desired.

Write today about your requirements

The Columbia Machine Works
and Malleable Iron Company
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. Green, Sales Mgr., Brooklyn, N. Y.
E. Keller, Brooklyn, N. Y.
F. C. Hedley, Brooklyn, N. Y.
J. L. Whittaker, 141 Milk St., Boston, Mass.
E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.

V-K

All MORE JONES Trolley Wheels, oilless and lubricated types, are made of pure new metal, comparatively soft ---yet extremely tough and durable. Their quality of conductivity is the highest obtainable.

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri

TROLLEY WHEELS:
V-K Oilless, M-J Lubricated
HARPS: V-K *Non-Arcing*

BEARINGS: *"Tiger" Bronze*
Axle and Armature

ARMATURE BABBITT
and Similar Products

MORE-JONES QUALITY PRODUCTS

With an eight-second headway in Sydney

H-B LIFE GUARDS

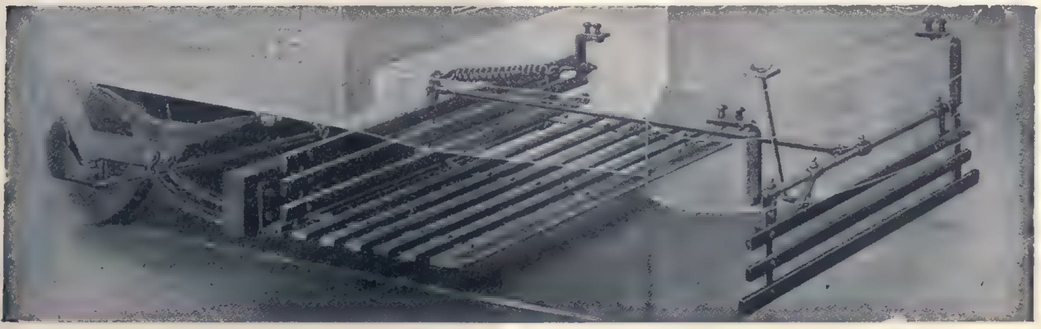
Protect Life and Limbs on Busy Streets

Even in far off Australia, as in most parts of the United States and Canada, H-B Guards are considered as much an essential part of street car equipment as brakes or motors. All the new type Sydney cars, as well as the older cars in service for years, are equipped with H-B Life Guards. You'll also find them in Cuba and in Spain, in England and in China.

Specify H-B Life Guards as manufactured by the Consolidated Car Fender Co.

Consolidated Car Fender Co.
Providence, R. I.

General Sales Agents:
Wendell & MacDuffie Co., 61 Broadway, N. Y.



$14,000.00 worth

of brand new gears salvaged from scrap by "Tool Steel"

WISDOM TOOTH pinions.

Here's the story: A large elevated railway line had had so much trouble with pinion breakage, (they had tried every manufacturer), that they changed from the standard tooth shape to a 20° stub for strength. In making the change, they discarded $14,000 00 worth of brand new gears, mostly "Tool Steel," because the gears had the old tooth shape and would not interchange with their new tooth. They were afraid to use the gears with any make of pinion because they would surely have occasional breakage.

In place of scrapping, at our suggestion, they mated these gears with "Tool Steel" *Wisdom Tooth* pinions, stronger at the root, and by this slight change at insignificant cost were able to salvage $14,000.00 worth of gears.

The Wisdom Tooth is not a "cure all" but it has cured and is curing some very serious troubles.

THE TOOL STEEL GEAR & PINION CO.
Cincinnati, Ohio

"49"

THE map above shows the location of the 49 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 3
St. Louis, 2
Buffalo, 4
Pittsburgh, 2
Cleveland, 2
Amherst, N. S.
Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul
Kansas City, Kan.
Denver
Tacoma
Sayre, Pa.
Berwick, Pa.
Albany
Toronto
New Glasgow, N. S.
Madison, Ill.
Huntington, W. Va.
Wilmington, Del.
Houston, Tex.
Hannibal, Mo.
Reading, Pa.
Baltimore
Richmond, Va.
Ft. William, Ont.
St. Thomas
Hamilton
Ramapo, N. Y.
Marshall, Tex.
Los Angeles
Council Bluffs
Rochester, N. Y.

American Railroad Association Standards

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

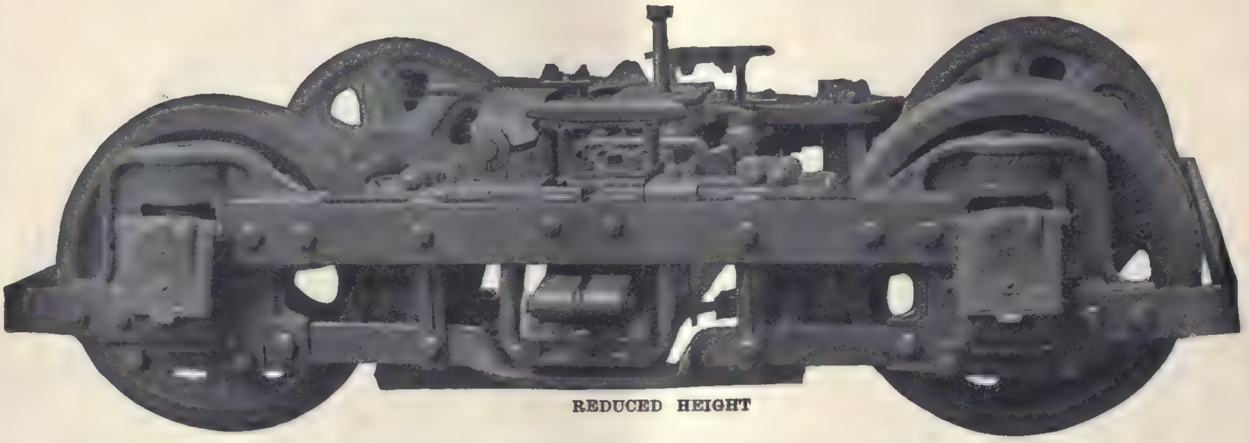
The Standard Wheel for Seventy-One Years

CHILLED IRON WHEELS for railway and street car service. Capacity 20,000 per day. 25,000,000 in service.

ASSOCIATION OF MANUFACTURERS
OF CHILLED CAR WHEELS
1847 McCormick Bldg., Chicago

CHILLED IRON WHEELS

R. H.
TAYLOR REDUCED HEIGHT TRUCK



TAYLOR R. H. TRUCK

Mounted on 26-in. Wheels with Springs Over Journal Boxes.
Designed to Mount Centre and End Entrance Cars Low Down.

SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car Bodies weighing 16,000 to 22,000 lb. Motors Inside Hung.

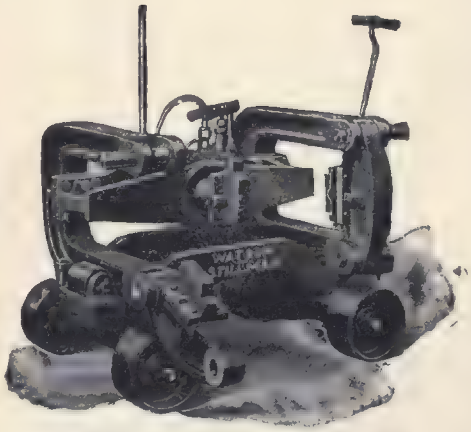
EASY RIDING

Journals 3¾ x 7 M. C. B. Type. Height from Rail to Body Bolster, 22¾ in. Brakes Inside Hung.

TAYLOR ELECTRIC TRUCK CO., TROY, N.Y.

SPECIFICATIONS ON REQUEST **Established 1892** **SEND FOR PORTFOLIO**

You Can Bend Rails Quickly and Economically With a Watson-Stillman Hydraulic Rail Bender



Hydraulic Portable Rail Bender

The portable rail bender shown herewith is designed for use on the road. It is equipped with interchangeable formed bending blocks, and will make any bend without buckling. The hinged yoke permits the rails to be put in sidewise. It can also be used for other heavy bending.

We build many other handy tools for the railway shop. Such as: Crank Pin Presses, Wheel Presses, Forcing Presses, Forging Presses, Jacks, Pit Jacks, Punches, Shears, Pumps, Accumulators, etc.

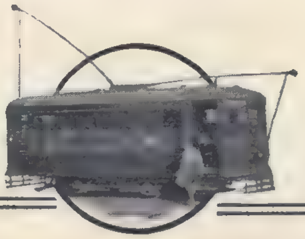
Write for Catalogs.

The Watson-Stillman Co., 46 Church St., New York

Chicago: McCormick Building **Philadelphia: Widener Building**

St. Louis Quality Equipment

Trucks
Forgings and Castings
Platform Brakes
Car Seats
Rattan for Repairs
Metal Trimmings
Curtains



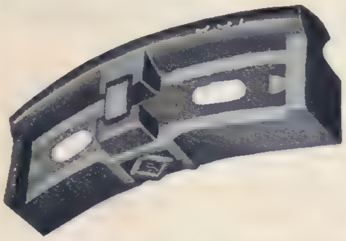
Remember—

to refer always to us for information and quotations on car equipment. Since 1889 we have been furnishing supplies of the most satisfactory kind to American electric railway companies.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

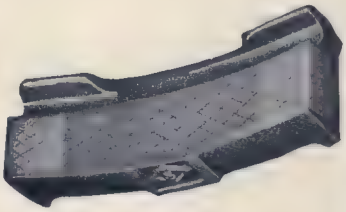
Brake Shoes
A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type



Standard Patterns for

SAFETY CAR



D-67 for Narrow Treads
D-87 for Wide Treads

American Brake Shoe and Foundry Co.
30 Church Street, New York
332 So. Michigan Ave., Chicago   Chattanooga, Tenn.

You're having brush trouble

CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. Jeandron
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

KERITE
DAY'S KERITE
Northern Pacific Railroad
KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

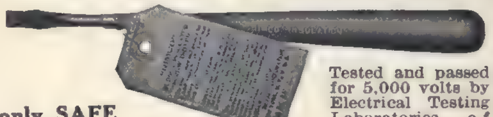
AIMCo REG. U. S. PAT. OFF.
Electric Railway Automatic Signals
for Accessibility and Reliability
EST. 1865 AIMco INC. 1916
"American" Insulating Machinery Company
REG. U. S. PAT. OFF.
Philadelphia, New York, Paris, England
Sales Agents:
Electric Service Supplies Co.
Philadelphia, New York Chicago

AMERICAN ELECTRICAL WORKS PHILLIPSDALE, R.I. AMELECTRIC Wires and Cables
Reg. U. S. Pat. Office
Galvanized Iron and Steel Wire and Strand
Incandescent Lamp Cord

AMELECTRIC PRODUCTS
BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 233 B'way.

"RIMCO" Insulated Screw Driver



Tested and passed for 5,000 volts by Electrical Testing Laboratories of N. Y. City.

The only SAFE Screw Driver for linemen and all high tension work

7½", 8½", 10½"

Semi-soft rubber insulation bonded to metal by Elchemco process. Insulation cannot crack or work loose.

RUBBER INSULATED PRODUCTS TRADE RIMCO MARK REG. U.S. PAT. OFF.
Rubber Insulated Metals Corporation
50 Church Street, New York City, U. S. A.
Distributed by The Electric Service Supplies Co., and other distributors
Export Distributor: International Western Electric Co.

NASHVILLE TIE COMPANY
Cross Ties: White Oak, Chestnut, and Treated Ties. Oak Switch Ties.
Prompt shipment from our own stocks.
Headquarters—Nashville, Tenn.
A. D. Andrews, Terre Haute, Ind., Representative.

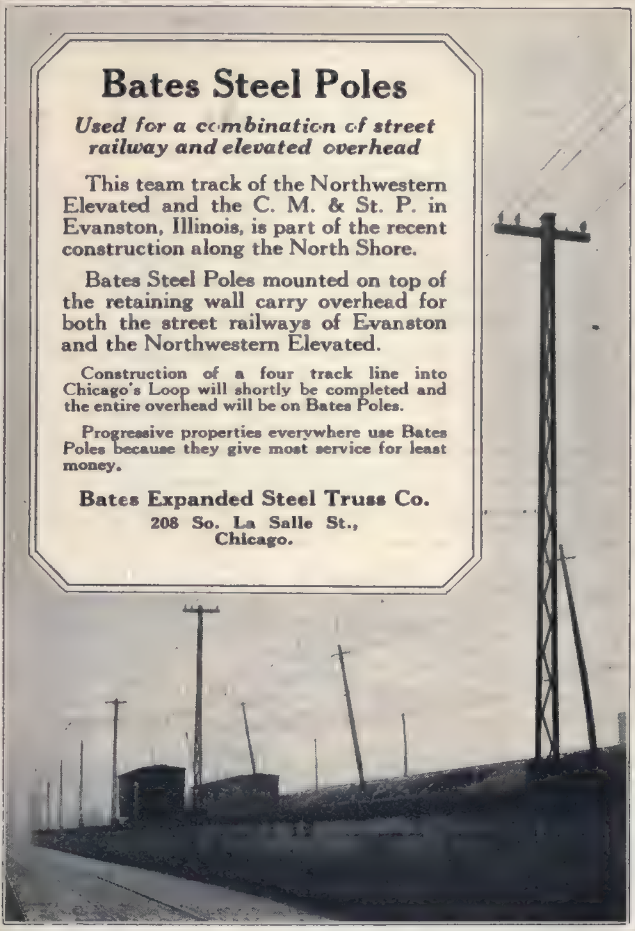
Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

STANDARD
Wires, Cables, Cable Accessories
Superior quality, economical prices
Standard Underground Cable Co.
Boston Philadelphia Pittsburgh Detroit
New York Washington Chicago St. Louis
San Francisco
STANDARD TRADE MARK

Electrical Wires and Cables
JOHN A. ROEBLING'S SONS CO., Trenton, N. J.

ANACONDA TROLLEY WIRE
THE AMERICAN BRASS COMPANY
General Offices
WATERBURY, CONN.
ANACONDA from mine to consumer
ANACONDA COPPER MINING COMPANY
Rolling Mills Department
CHICAGO, ILL.

Chapman Automatic Signals
Charles N. Wood Co., Boston



Bates Steel Poles

Used for a combination of street railway and elevated overhead

This team track of the Northwestern Elevated and the C. M. & St. P. in Evanston, Illinois, is part of the recent construction along the North Shore.

Bates Steel Poles mounted on top of the retaining wall carry overhead for both the street railways of Evanston and the Northwestern Elevated.

Construction of a four track line into Chicago's Loop will shortly be completed and the entire overhead will be on Bates Poles.

Progressive properties everywhere use Bates Poles because they give most service for least money.

Bates Expanded Steel Truss Co.
208 So. La Salle St.,
Chicago.

Nachod Spells Safety

Nachod Signals safeguard and aid your traffic.

Nachod Crossing Signals protect your highway crossing.

Nachod Headway Recorders safeguard your revenue by showing car operation.

Write for information

Nachod Signal Co., Incorporated
Louisville, Ky.

ERICO
ECONOMICAL
EFFICIENT

RAIL BONDS

THE ELECTRIC RAILWAY IMPROVEMENT CO.
CLEVELAND, OHIO

International Creosoting & Construction Co.
Galveston, Texas

Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

RWB DYNAMOTORS

FOR
CARBON ARC RAIL JOINT WELDING
CARBON ARC RAIL BONDING
CARBON and METALLIC ARC GENERAL WELDING
Rail Welding and Bonding Co., Cleveland, O.

FLOOD CITY

Rail Bonds and Trolley Line Specialties

Flood City Mfg. Co., Johnstown, Pa.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way.
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
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Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.

American
Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
TRIPLEX

Arc Weld and Flame Weld

*Send for new
Rail Bond book*

American Steel & Wire
Company
CHICAGO
NEW YORK

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

SPECIAL TRACKWORK
Of the well-known WHARTON Superior Designs
and Constructions

Steel Castings
Converter and
Electric

Forgings
Drop Hammer
and Press

Gas Cylinders
Seamless
Steel

Wm. Wharton Jr. & Co. Inc., Easton, Pa.
(Subsidiary of Taylor-Wharton Iron & Steel Co.,
High Bridge, N. J.)

ORIGINATORS OF
MANGANESE STEEL TRACKWORK

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of
Water Tube Boilers
of continuing reliability

BRANCH OFFICES
BOSTON, 49 Federal Street
PHILADELPHIA, North American Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
FORT WORTH, TEX., Flatiron Building
HONOLULU, H. T., Castle & Cooke Building

WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters
since 1898 and of Chain Grate
Stokers since 1893

BRANCH OFFICES
DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

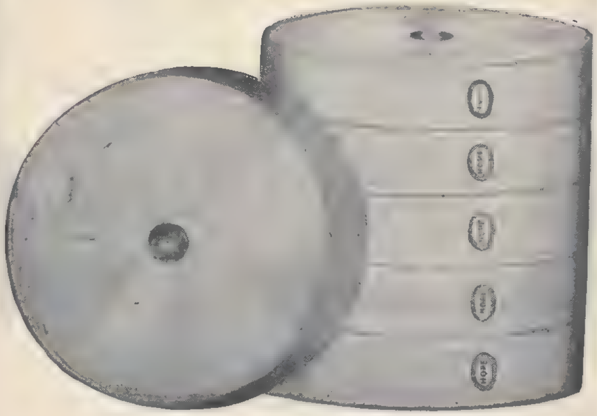
ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines,
Condensers, Gas and Oil Engines, Air Compressors,
Air Brakes

I. T. E.
Circuit Breakers
for heavy street railway work are
the best obtainable. Write for New
Complete Catalogue.

FOSTER SUPERHEATERS
A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits
POWER SPECIALTY COMPANY, 111 BROADWAY, NEW YORK
Boston Philadelphia Pittsburgh Kansas City Dallas Chicago San Francisco London, Eng

HOPE TAPES



For results — Tapes, Webbings, Sleevings, of uniform and standard quality for electric purposes, that is, Hope Webbing Company service.

Send for samples and prices

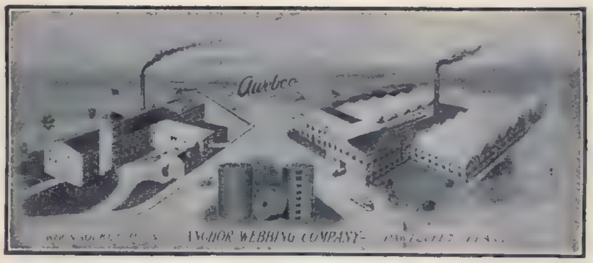
HOPE WEBBING CO.
Providence
New York Troy Chicago

TRACTIONS

POWER GEARS OF ROLLING STOCK PROTECTED WITH

BORNE SCRYMSER COMPANY
METAL LIFE
FOR
-CABLES-
GEARS
PINIONS
80 SOUTH ST. NEW YORK

ASK US FOR FACTS



Use only Awebco Tape on your Armatures
Field Coils have better protection when wound with "AWEBCO Tape." Send for samples.

ANCHOR WEBBING COMPANY
300 Brook Street, Pawtucket, Rhode Island

THE WORLD'S STANDARD

"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.
Sales Representatives in the Principal Cities

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

STERLING VARNISH

Manufactured by electrical engineers who will understand your insulating problems and render intelligent service. Noted for uniformity and quality. It will pay you to get in touch with

The Sterling Varnish Co., Pittsburgh, Penna.

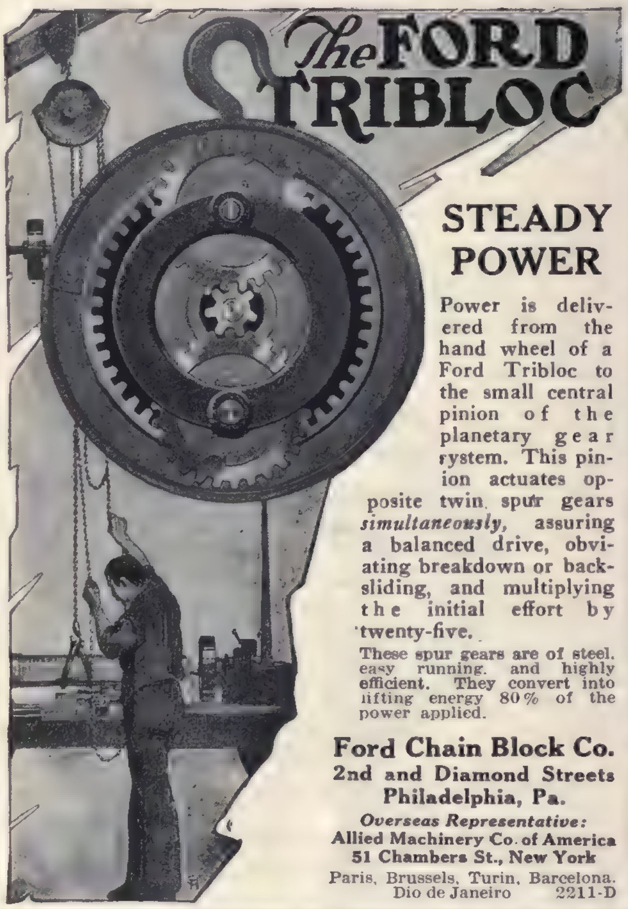
SUPER-SEASONED FIBRE

Peerless Insulation Paper has 25 to 50 per cent higher electrical resistance.

S-S
TRADE MARK

Hornflex Insulation Paper has no grain. Folds without cracking.

NATIONAL FIBRE & INSULATION CO.
Box 417-C, Yorklyn, Delaware



The FORD TRIBLOC

STEADY POWER

Power is delivered from the hand wheel of a Ford Tribloc to the small central pinion of the planetary gear system. This pinion actuates opposite twin spur gears *simultaneously*, assuring a balanced drive, obviating breakdown or backsliding, and multiplying the initial effort by twenty-five.

These spur gears are of steel, easy running, and highly efficient. They convert into lifting energy 80% of the power applied.

Ford Chain Block Co.
2nd and Diamond Streets
Philadelphia, Pa.
Overseas Representative:
Allied Machinery Co. of America
51 Chambers St., New York
Paris, Brussels, Turin, Barcelona.
Dio de Janeiro 2211-D

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio

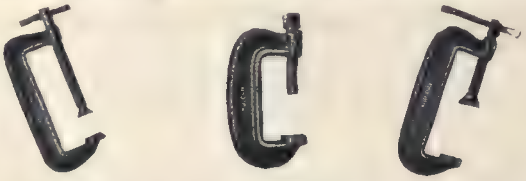
We Specialize in Electric Railway Lubrication

Tulc, a lubricant, gives many advantages, in operation *and* reduces the cost of lubrication. Our service men are engineers, and besides advising proper methods, will pack your cars, show you how and why Tulc should be used, and get money-saving results. Ask us for details.

***The* Universal Lubricating Co.**
Cleveland, Ohio

TULC A LUBRICANT

Scientifically and accurately compounded to reduce lubricating costs.



WILLIAMS' SUPERIOR DROP-FORGED CLAMPS

11 Patterns, in a wide range of sizes
for every clamping purpose

J. H. WILLIAMS & CO.
"The Drop-Forging People"

BROOKLYN 143 Richards St.
BUFFALO 143 Vulcan St.
CHICAGO 1143 W. 120th St.

ELECTRIC CAR HEATERS
THERMOSTATIC CONTROL
CONSOLIDATED CAR HEATING COMPANY
ELECTRO-PNEUMATIC
DOOR OPERATING DEVICES

PS HEATERS

Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. **Write for details.**

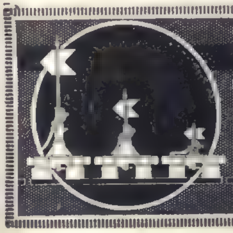
The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

"Boyerized" Products Reduce Maintenance

- Bemis Trucks
- Case Hardened Brake Pins
- Case Hardened Bushings
- Case Hardened Nuts and Bolts
- Manganese Brake Heads
- Manganese Transom Plates
- Manganese Body Bushings
- Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

BEMIS CAR TRUCK CO., Springfield, Mass.



RAMAPO
Automatic Return Switch Stands for Passing Sidings
Automatic Safety Switch Stands
Manganese Construction Tee Rail Special Work
RAMAPO IRON WORKS
HILLBURN · NEW YORK
Plants at Hillburn, N.Y. and Niagara Falls, N.Y. New York Office 30 Church St.

Railroad and Tram Car Specialties

New inventions developed, perfected
and worked for the English market

Messrs. G. D. Peters & Co., Ltd.
Windsor Works, Slough (Bucks), Eng.

THE MOST SUCCESSFUL MEN IN THE
ELECTRIC RAILWAY INDUSTRY READ THE
ELECTRIC RAILWAY JOURNAL
EVERY WEEK

THE old-time merchant, who did business on the basis of a good memory and a personal acquaintance with all his customers, is rapidly passing.

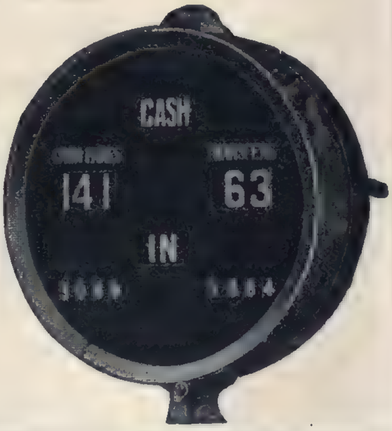
Store keeping is now based on cash registers, adding machines, and tried out systems.

International Registers are the foundation of adequate system in the business of street railway transportation. They fit into the complete accounting methods of the majority of city systems just as the cash register does in the merchant's system.

We'll be glad to tell you where they're used, and why.

The International Register Co.
15 So. Throop St.
Chicago, Ill.

Exclusive selling agents for HEEREN ENAMEL BADGES.



THE
Difference in Advertising
Is the
Difference in Men

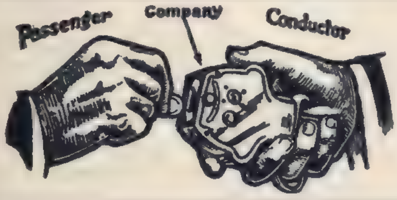
The differences in advertising are the differences which exist in men.

Just as some men are strong and virile and interesting, so is some advertising. And just as some men are ineffectual and weak and boring, so is some other advertising.

"Does it pay to advertise?" It pays those men who are keen enough students of their public to make it pay them. It pays those men who are truthful, sincere, interesting and believable.

It pays the men whose product deserves the payment, whose brains are keen enough to organize for success and judge enough of the human mind to know how to tell their story with sincerity and interest.

Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies



Direct Automatic Registration
By the
Passengers
Rooke Automatic Register Co.
Providence, R. I.

JOHNSON Universal Changer

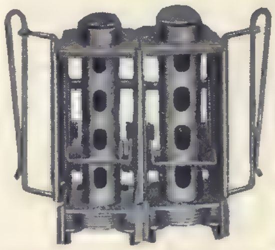
Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels, to suit his personal requirements and to facilitate the addition of extra barrels.

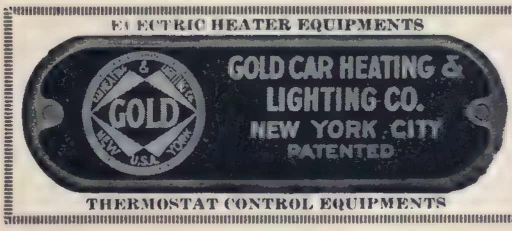
JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.



ELECTRIC HEATER EQUIPMENTS

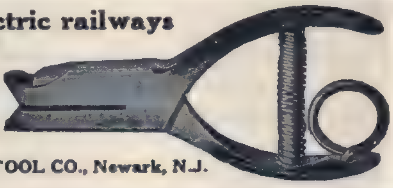
THERMOSTAT CONTROL EQUIPMENTS

Address All Communications to
BUSH TERMINAL
(220 36th St.)
Brooklyn, N. Y.
Literature on Request



Tickets and Cash Fares.
THE CLEVELAND
accommodates both
The Cleveland Fare Box Co.
CLEVELAND OHIO
Canadian Cleveland Fare Box Co., Ltd.,
Preston Ontario

75% of the electric railways
use
B-V Punches
Send for Catalog
BONNEY-VEHSLAGE TOOL CO., Newark, N.J.



Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.
AMERICAN RATTAN & REED MFG. CO.
Brooklyn, N. Y.
AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION

N-L
Indicating Signals
Mechanical Sanders
Ventilators, Smokestacks
Pneumatic Sanders
Selector Switches, Lanterns, etc.
THE NICHOLS-LINTERN CO.
8404 Lorain Ave., Cleveland, Ohio

Car Seat and Snow Sweeper *Rattan*

For 60 years we have been importing rattan from the Islands in the Indian Ocean. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

SALES OFFICES:

Heywood-Wakefield Co.,
516 West 34th St., New York.

Heywood-Wakefield Co.,
1415 Michigan Ave., Chicago.

E. F. Boyle,
Monadnock Bldg., San Francisco, Cal.

F. N. Grigg,
630 Louisiana Ave., Washington, D.C.

Railway and Power Engineering Corp., Toronto and Montreal.
G. F. Cotter Supply Co., Houston, Texas.

METER THE ENERGY
that's what you want to save

Then double the saving by inspecting cars on a kilowatt-hour basis instead of mileage or time-basis. Ask for data.

ECONOMY ELECTRIC DEVICES COMPANY
L. E. Gould, 37 W. Van Buren St., Chicago

GENERAL AGENT: Lind Aluminum Field Coils.
DISTRICT AGENTS: Peter Smith Heaters, Woods Lock Till Fare Boxes, Bemis Truck Specialties, Miller Trolley Shoes.

Gets Every Fare

PEREY TURNSTILES or PASSIMETERS

Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
30 Church Street, New York City

See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

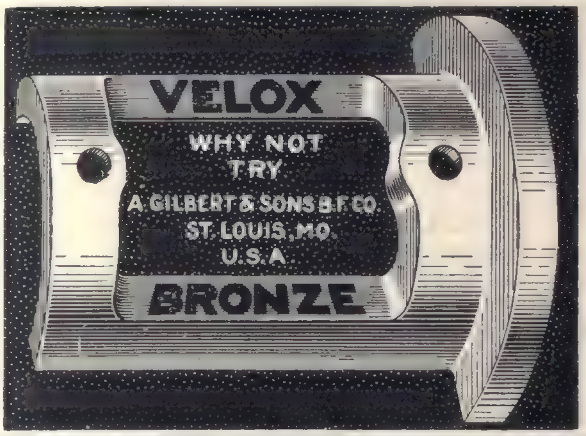
STEEL AND STEEL PRODUCTS

MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY

General Sales Office: WIDENER BUILDING, PHILADELPHIA, PA.

DISTRICT SALES OFFICES:
Atlanta Boston Chicago Cincinnati Cleveland Detroit New York Philadelphia Pittsburgh San Francisco Salt Lake City Seattle St. Louis Washington, D. C.

Consolidated Steel Corporation, 25 Broadway, New York, is the sole exporter of our commercial products.


VELOX
WHY NOT TRY
A. GILBERT & SONS B. F. CO.
ST. LOUIS, MO.
U. S. A.
BRONZE

B. A. Hegeman, Jr., President
Charles C. Castle, First Vice-President
Harold A. Hegeman, Vice-Pres. and Treas.
W. C. Lincoln, Mgr. Sales and Engineering
Fred C. J. Dell, Secretary

National Railway Appliance Co.

Grand Central Terminal
452 Lexington Ave., Cor. 45th St., N. Y.

BRANCH OFFICES:
Munsey Bldg., Washington, D. C. 100 Boylston Street, Boston, Mass.
85 Union Trust Bldg., Harrisburg, Pa.
Hegeman-Castle Corporation, 343 So. Dearborn St., Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Anderson Slack Adjusters
Genesco Paint Oils
Dunham Hopper Door Device
Feasible Drop Brake Staffs
Flaxlinum Insulation
Anglo-American Varnishes, Paints, Enamels, Surfacers, Shop Cleaner.
Johnson Fare Boxes
Peerless and Perry Side Bearings
Drew Line Material and Railway Specialties
Hartman Centering Center Plates
Economy Power Saving Meters
H & W Electric Heaters
Garland Ventilators
Pitt Sanders
National Safety Car Equipment Co.'s One-Man Safety Cars
Central Equipment Company's Hand Holds
Tnemco Paint & Oil Company's Cement Paint

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

141-151 WEST 22D ST.
Chicago, Ill.

Write for Catalogue

1328 Broadway
New York, N. Y.

The Rex-L Turnstile
Model 50

Positive, tamper-proof, registering device. Individual release for each person. Conforms to U. S. Internal Revenue Department Rules. Used by Boston Elevated Railway Company.

Write us for consultation

DAMON-CHAPMAN COMPANY
Rochester, N. Y.

SEARCHLIGHT SECTION

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 5 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 14 inches	4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

ELECTRICIAN to take full charge of line work of 18 mile suburban line in the East. State experience and salary desired in first letter. P-453, Elec. Ry. Journal.

POSITIONS WANTED

CAR painter wants position. Is a good all around mechanic and has had years of fine experience. Good habits. PW-460, Elec. Ry. Journal.

ELECTRICAL man, practical and technical training, executive ability and experience in A.C. and D.C. railway light and power equipment, desires position as armature room foreman or chief electrician. PW-457, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

MAN with five years' experience in travelling capacity installing electrically welded rail joints and with experience in electric shop welding, desires permanent connection with electric railroad anywhere in United States or Canada. PW-456, Elec. Ry. Journal, Leader-News Bldg., Cleveland, O.

PRACTICAL master mechanic, 41 years old, married, desires change, 22 years' experience in all mechanical departments. Can rebuild and maintain equipment at minimum cost. Reference, past and present employers. PW-454, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

POSITIONS WANTED

SUPERINTENDENT of transportation, with a proven successful record of 18 years on large city, suburban and interurban properties, at present employed, desires a change and will consider any property that needs a capable, efficient official who possesses a full knowledge of all details of transportation and is capable of getting results. Very successful in public relations and dealing with labor. Best of references from leading men in electric railway field. Personal reasons for desiring change. PW-455, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

YOUNG man with three years' experience in power house and car-barn, desires position; a go getter. PW-458, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

FOR SALE

Registers, Fare Boxes

For Sale—62 Type R-5 International double registers, and 38 No. 2025 Johnson fare boxes; in good condition. Gary Street Railway Co., Gary, Ind.

FOR SALE

MOTORS

12—Rebuilt GE-247 Motors.

TRANSIT EQUIPMENT COMPANY,
501 Fifth Avenue, New York.

For Sale At Attractive Figures

2400 gross tons, 6015-60 lb. ASCE-A1 Relaying rail and continuous rail joints.
1—Double Truck Work Car, complete with large snow plow.
1—15-ton Express Freight Car (Brill Trucks).
2—McGuire-Cummings 25-ton Express Cars.
5—Combination Passenger Cars (Brill Trucks.

All equipment has G. E. 80-40-hp. motors. The rail and rolling stock was formerly the property of the Joliet and Eastern Traction Company and is now stored at Plainfield. New Lenox and Matteson, Illinois.

GEO. THEIS, JR.
Arkansas Valley Interurban Railway Co.,
Wichita, Kansas.

FOR SALE

SECOND HAND CARS

trucks and motors

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Phila., Pa.

700 tons new 9 in.

GIRDER RAIL

Penna. Steel Co. Section 228. 107 lb. to the yard. Attractive price upon application. Subject to R. W. Hunt & Company's Inspection. Prompt shipment.

H. M. FOSTER COMPANY
Continental Building, Baltimore, Md.

Eleven-Mile Electric Trolley System For Sale

BUY BEFORE EQUIPMENT IS SCRAPPED

11 miles of 60-70 lb. standard rail complete with frogs, switches, ties, overhead trolley wire, wooden poles, etc.
11—single truck cars suitable for converting into one-man cars, work or flat cars.
7—double truck, 10-seated, closed cars; good condition.
23—new and repaired 1,000-C.E. and 12-A. armatures.

Arrange to inspect this equipment at once, as it must be sold within two weeks.

Write *Wire* *Phone: Waverly 0660*

R. GELB & SONS **216 Livingston Street, Newark, N. J.**

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

0098

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Cambria Steel Co.
Midvale Steel & Ord. Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Supplies Co.
International Register Co., The
Bankers and Brokers
Coal & Iron National Bank
Batteries, Dry
Nichols-Lintern Co.
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons B. F. Co.
More-Jones Br. & Metal Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Bearings, Center and Roller Side
Stucki Co., A.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Benders, Rail
Ry. Track-work Co.
Watson-Stillman Co.
Boilers
Babcock & Wilcox Co.
Boiler Tubes
Cambria Steel Co.
Midvale Steel & Ord. Co.
Bond Testers
Amer, Steel & Wire Co.
Elec. Service Supplies Co.
Rail Welding & Bonding Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Imp. Co.
Elec. Service Suplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Bonds, Rail
Amer. Steel & Wire Co.
Elec. Railway Imp. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.
Book Publishers
McGraw-Hill Book Co., Inc.
Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Bates Exp. Steel Truss Co.
Creaghead Eng. Co.
Elec. Ry. Equip. Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.
Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse Elec. & M. Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Buses, Motor
Brill Co., The J. G.
Mitten-Traylor, Incorporated
Bushings
Nat'l Fibre & Insulation Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Cables
(See Wires and Cables)
Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.
Carbon Brushes
(See Brushes, Carbon)
Car Lighting Apparatus
Elec. Service Supplies
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
Cars, Dump
Differential Steel Car Co., Inc.
Cars, Passenger Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire Cummings Mfg. Co.
Midvale Steel & Ord. Co.
National Ry Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Witt, Peter
Cars, Second Hand
Electric Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A & J. M.
Columbia M. W. & M. I. Co.
More-Jones Br. & Metal Co.
Castings, Funnel
Wharton, Jr., & Co., Inc. Wm.
Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Wharton Jr., & Co., Inc., Wm.
Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Catchers and Retrievers Trolley
Earll, C. I.
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Circuit Breakers
Cutter Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Westinghouse Elec. & M. Co.
Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Coin-Counting Machines
International Register Co. The
Johnson Fare Box Co.
Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Compressors, Gas
Ingersoll-Rand Co.
Concrete Reinforcing Bars
Cambria Steel Co.
Midvale Steel & Ord. Co.
Condensers
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Conduits, Underground
Std. Underground Cable Co.
Connectors, Solderless
Westinghouse Elec. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Controller Regulators
Electric Service Supplies Co.
Controlling Systems
General Electric Co.
Westinghouse Elec. & M. Co.
Converters, Rotary
General Electric Co.
Westinghouse Elec. & M. Co.
Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Mining Co.
Cord Adjusters
Nat'l Fibre & Insulation Co.
Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works
Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The, J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
Cross Arms, (See Brackets)
Crossing Foundations
International Steel Tie Co.
Crossing Frogs and Switches
Wharton, Jr., & Co., Inc., Wm.
Crossings, Manganese
Indianapolis Switch & Frog Co.
Crossing Signals. (See Signals, Crossing)
Crossings, Track. (See Track, Special Work)
Culverts
Canton Culvert & Silo Co.
Curtains and Curtain Fixtures
Brill Co., The, J. G.
Electric Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.
Dealers' Machinery
Electric Equipment Co.
Transit Equipment Co.
Destination Signs
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Electric Service Supplies Co.
Detective Service
Wish Service, P. Edward
Dogs, Lathe
Williams & Co., J. H.
Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Doors and Door Fixtures
Brill Co., The, J. G.
General Electric Co.
Safety Car Devices Co.
Doors, Folding Vestibule
National Pneumatic Co., Inc.
Draft Rigging. (See Couplers)
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Electric Service Supplies Co.
Electrodes, Carbon
Indianapolis Switch & Frog Co.
Electrodes, Steel
Indianapolis Switch & Frog Co.
Electrical Wires and Cables
American Elec. Works
Roeblings Sons Co., J. A.
Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Beeler John A.
Crosett Co., Jas. H.
Day & Zimmerman, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Smith & Co., C. E.
Stone & Webster
Witt, Peter
Engines, Gas, Oil and Steam
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.
Expansion Joints, Track
Wharton Jr., & Co., Inc., Wm.
Fare Boxes
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.
Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.
Cambria Steel Co.
Midvale Steel & Ordnance Co.
Fenders and Wheel Guards
Brill Co., The, J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Sup. Co.
Star Brass Works
Fibre and Fibre Tubing
Nat'l Fibre & Insulation Co.
Westinghouse Elec. & M. Co.
Field Coils. (See Coils)
Flaxlinum Insulation
Nat'y Ry. Appliance Co.
Floodlights
Electric Service Sup. Co.
Floor Plates
Amer. Abrasive Metals Co.
Flooring, Composition
American Mason Safety Tread Co.
Forgings
Cambria Steel Co.
Columbia M. W. & M. I. Co.
Midvale Steel & Ordnance Co.
Williams & Co., J. H.
Frogs, Track. (See Track Work)
Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co
Williams & Co., J. H.
Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.
Gaskets
Power Specialty Co.
Westinghouse Tr. Br. Co.
Gas-Electric Cars
General Electric Co.
Gas Producers
Westinghouse Elec. & M. Co.
Gasolene Torches
Economy Elec. Devices Co.
Gates, Car
Brill Co., The, J. G.
Gear Blanks
Cambria Steel Co.
Midvale Steel & Ord. Co.
Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & M. Co.
Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
Generating Sets, Gas-Electric
General Electric Co.
Generators
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Goggles, Safety
Indianapolis Switch & Frog Co.
Gongs (See Bells and Gongs)
Greases. (See Lubricants)
Grinders and Grinding Supplies
Indianapolis Switch & Frog Co.
Railway Track-work Co.
Grinding Blocks and Wheels
Railway Track-work Co.
Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Hammers, Pneumatic
Ingersoll-Rand Co.
Harps, Trolley
Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Helmets, Welding
Indianapolis Switch & Frog Co.
Headlights
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Heaters, Car (Electric)
Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter
Heaters, Car, Hot Air and Water
Electric Service Sup. Co.
Smith Heater Co., Peter
Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford Chain-Block Co.
Hoists, Portable
Ingersoll-Rand Co.
Hose, Bridge
Ohio Brass Co.
Hydraulic Machinery
Watson-Stillman Co.
Instruments, Measuring, Testing and Recording
Economy Electric Devices Co.
Electric Service Sup. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Insulating Cloth, Paper and Tape
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Irvington Varnish & Ins. Co.
National Fibre & Insulation Co.
Westinghouse Tr. Br. Co.
Insulating Machinery
Amer. Ins. Machinery Co.
Insulating Silk
Irvington Varnish & Ins. Co.
Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.

The Kalamazoo Trolley Wheels

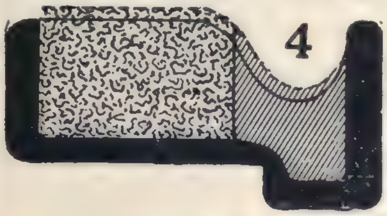
have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be mislead by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Don't Remove Worn Wheels

It isn't necessary any more. Just equip your cars with Wheel Truing Brake Shoes.

If only the wheel tread needs truing, ask us to send you the brake shoe (section shown herewith).



We have a brake shoe for every kind of wheel wear.

Wheel Truing Brake Shoe Co.
Detroit, Michigan

"THEY'RE FORGED—NOT CAST
THAT'S WHY THEY LAST"

"CLEVELAND" ALL COPPER

(No Alloy)

TROLLEY WHEELS

Lasting service in a Trolley Wheel calls for balance and toughness. Forged Copper Wheels have both and the consequent saving is high.

Send for Particulars

THE COPPER PRODUCTS FORGING CO.
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"Reproduction of Ajax Car Brass that ran 336,000 miles before wearing too thin for further use."

This Car Brass was sent to us by a large Electric Railway System

We do not guarantee all our Car Brasses to wear as long—but this Time Record points to why, after thirty years' experience, Ajax Metals stand at the top.

Ajax Car Brasses, Check Plates and Babbitt Metals help to increase your dividends by wearing longer.

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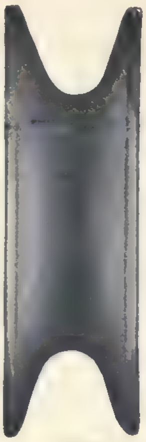
Main Office and Works: Philadelphia, Pa.

Speed and Safety

will result from the constant use of Bayonet Equipment. Renewals made instantly.



"U"

Bayonet Special Trolley Wheels

are made from the highest grade metal and are hand turned, insuring greatest accuracy and balance. Reputation was gained by competitive tests.

Bayonet Detachable Trolley Harps

are the only trolley harps with which you can change from wheel to sleet cutter or to a new wheel in ten seconds. No tools required on top of the car. Inspections, repairs, adjustments and lubricating done at work bench later on when no schedules are being held up.

Bayonet Trolley Base with Detachable Pole Clamp

is the only trolley clamp made on which the trolley pole can be changed in 30 seconds and the wheel be in perfect alignment with the wire. No tools are required to do this job. It prevents schedules being delayed. A uniform wire pressure at all angles of the pole is obtained, thus saving on your overhead, wheel and wire.

Bayonet Sleet Cutters

have no superiors when it comes to cutting ice from the wire. Both rigid and semi-rotary types furnished.

Bayonet Trolley Harp Co.

Springfield, Ohio

- Electric Service Sup. Co.
- General Electric Co.
- Irvington Varnish & Ins. Co.
- Westinghouse Elec. & M. Co.

Insulators. (See also Line Material)
- Anderson M. Co., A. & J. M.
- Creaghead Engineering Co.
- Electric Ry. Equipment Co.
- Electric Service Sup. Co.
- Irvington Varnish & Ins. Co.
- Ohio Brass Co.
- Westinghouse Elec. & M. Co.

Insulator Pins
- Electric Service Sup. Co.
- Hubbard & Co.

Insulation Slot
- Irvington Varnish & Ins. Co.

Insulating Varnishes
- Irvington Varnish & Ins. Co.

Insurance, Fire
- Marsh & McLennan

Inventions Developed and Perfected
- Peters & Co., G. D.

Jacks. (See also Hoists and Lifts)
- Buckeye Jack Mfg. Co.
- Columbia M. W. & M. I. Co.
- Electric Service Sup. Co.
- National Ry Appliance Co.
- Watson-Stillman Co.

Journal Boxes
- Bemis Car Truck Co.
- Brill Co., The, J. G.

Labor Adjusters
- Corporation Service Bureau, The

Lamp Guards and Fixtures
- Anderson M. Co., A. & J. M.
- Electric Service Sup. Co.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Lamps, Arc and Incandescent (See also Headlights)
- Anderson M. Co., A. & J. M.
- General Electric Co.
- Nat'l Elec. Specialty Co.
- Westinghouse Elec. & M. Co.

Lamps, Signal and Marker
- Nichols-Lintern Co.

Lanterns, Classification
- Nichols-Lintern Co.

Lathe Attachments
- Williams & Co., J. H.

Leather Cloth
- The Standard Textile Products Corp.

Lightning Protection
- Anderson M. Co., A. & J. M.
- Electric Service Sup. Co.
- General Electric Co.
- Ohio Brass Co.
- Westinghouse Elec. & M. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
- Anderson M. Co., A. & J. M.
- Archbold-Brady Co.
- Columbia M. W. & M. I. Co.
- Creaghead Engineering Co.
- Electric Ry. Equipment Co.
- Electric Service Sup. Co.
- English Electric Co.
- General Electric Co.
- Hubbard & Co.
- More-Jones Br. & Metal Co.
- Westinghouse Elec. & M. Co.

Locking Spring Boxes
- Wharton, Jr. & Co., Inc. Wm.

Locomotives, Electric
- General Electric Co.
- McGuire Cummings Mfg. Co.
- Westinghouse Elec. & M. Co.

Lubricating Engineers
- Galena-Signal Oil Co.
- Universal Lubricating Co.
- Vacuum Oil Co.

Lubricants, Oil and Grease
- Borne, Scrymser Co.
- Galena-Signal Oil Co.
- Universal Lubricating Co.
- Vacuum Oil Co.

Lumber. (See Poles, Ties, etc.)

Machine Tools
- Columbia M. W. & M. I. Co.
- Watson-Stillman Co.

Manganese Steel, Special Track Work
- Indianapolis Switch & Frog Co.
- Wharton, Jr. & Co., Inc., Wm.

Meters, Car Watt-Hour
- Economy Elec. Devices Co.

Motor Buses (See Buses, Motor)

Motormen's Seats
- Brill Co., The, J. G.
- Electric Service Sup. Co.
- Wood Co., Chas. N.

Motors, Electric
- General Electric Co.
- Westinghouse Elec. & M. Co.

Motor and Generator Sets
- General Electric Co.

Nails
- Cambria Steel Co.
- Midvale Steel & Ord. Co.

Nuts and Bolts
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Hubbard & Co.

Oils (See Lubricants

Packing
- Electric Service Sup. Co.
- Power Specialty Co.
- Westinghouse Tr. Br. Co.

Paints and Varnishes for Woodwork
- National Ry. Appliance Co.

Pavement Breakers
- Ingersoll-Rand Co.

Paving Material
- Amer. Br. Shoe & Fdry Co.

Pickups, Trolley Wire
- Electric Service Supplies Co.
- Ohio Brass Co.

Pinion Pullers
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- General Electric Co.
- Wood Co., Chas. N.

Pinions. (See Gears)

Pins, Case Hardened, Wood and Iron
- Bemis Car Truck Co.
- Electric Service Sup. Co.
- Ohio Brass Co.
- Westinghouse Tr. Br. Co.

Pipe Fittings
- Power Specialty Co.
- Watson-Stillman Co.
- Westinghouse Tr. Br. Co.

Planers. (See Machine Tools)

Pliers, Rubber Insulated
- Electric Service Sup. Co.
- Rubber Insulated Metals Corp.

Pneumatic Tools & Accessories
- Ingersoll-Rand Co.

Pole Reinforcing
- Drew Elec. & Mfg. Co.
- Hubbard & Co.

Poles, Metal Street
- Bates Expanded Steel Truss Co.
- Electric Ry. Equip. Co.
- Hubbard & Co.

Poles and Ties, Treated
- International Creosoting & Construction Co.
- Page & Hill Co.

Poles, Ties, Posts, Piling and Lumber
- International Creosoting & Construction Co.
- Nashville Tie Co.
- Page & Hill Co.

Poles, Trolley
- Anderson Mfg. Co., A. & J. M.
- Bayonet Trolley Harp Co.
- Columbia M. W. & M. I. Co.
- Nuttall Co., R. D.

Poles, Tubular Steel
- Elec. Ry. Equip. Co.
- Electric Service Sup. Co.

Power Saving Devices
- Economy Electric Devices Co.
- Nat'l Ry. Appliance Co.

Pressure Regulators
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Pumps
- Ingersoll-Rand Co.
- Schutte & Koertling Co.
- Watson-Stillman Co.

Pumps, Vacuum
- Ingersoll-Rand Co.

Punches, Ticket
- Bonney-Vehslage Tool Co.
- International Register Co., The
- Wood Co., Chas. N.

Punching Machinery
- Watson-Stillman Co.

Rails
- Cambria Steel Co.
- Midvále Steel & Ord. Co.

Rail Joints, Welded
- Indianapolis Switch & Frog Co.

Rail Grinders. (See Grinders)

Railway Safety Switches
- Consolidated Car Heating Co.
- Westinghouse Elec. & M. Co.

Rail Welding. (See Welding Processes)
- Ry. Track-work Co.
- Rail Welding & Bonding Co.

Rattan
- Amer. Rattan & Reed Mfg. Co.
- Brill Co., The J. G.
- Electric Service Sup. Co.
- McGuire Cummings Mfg. Co.
- St. Louis Car Co.

Registers and Fittings
- Brill Co., The, J. G.
- Electric Service Sup. Co.
- International Reg. Co., The
- Ohmer Fare Register Co.
- Rooke Automatic Reg. Co.

Reinforcement, Concrete
- Amer. Steel & Wire Co.

Repair Shop Appliances. (See also Coil Banding and Winding Machines)
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Repair Work. (See also Coils)
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Replacers, Car
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Resistance, Grid
- Columbia M. W. & M. I. Co.

Resistance, Wire and Tube
- General Electric Co.
- Westinghouse Elec. & M. Co.

Resistances
- Consolidated Car Heating Co.

Retrievers, Trolley. (See Catchers and Retrievers, Trolley)

Rheostats
- General Electric Co.
- Westinghouse Elec. & M. Co.

Sanders, Track
- Brill Co., The, J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Nichols-Lintern Co.
- Ohio Brass Co.
- St. Louis Car Co.

Sash Fixtures, Car
- Brill Co., The, J. G.

Scrapers, Track. (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
- Electric Service Supplies Co.
- Rubber Insulated Metals Corp.

Seating Materials
- Brill Co., J. G.
- St. Louis Car Co.
- Standard Textiles Products Corp., The

Seats, Car. (See also Rattan)
- Amer. Rattan & Reed Mfg. Co.
- Brill Co., The, J. G.
- Heywood-Wakefield Co.
- Peters & Co., G. D.
- St. Louis Car Co.

Second-Hand Equipment
- Electric Equipment Co.

Secret Service
- Corporation Service Bureau, The

Securities Electric Railway
- Bonbright & Co.

Shades, Vestibule
- Brill Co., The, J. G.

Shovels
- Hubbard & Co.

Shovels, Power
- Brill Co., The, J. G.

Signals, Car Starting
- Consolidated Car Heating Co. Co.
- Electric Service Supplies Co.
- Nat'l Pneumatic Co., Inc.

Signals, Indicating
- Nichols-Lintern Co.

Signal Systems, Block
- Electric Service Supplies Co.
- Nachod Signal Co., Inc.
- Union Switch & Signal Co.
- U. S. Electric Signal Co.
- Wood Co., Chas. N.

Signal Systems, Highway Crossing
- Nachod Signal Co., Inc.
- U. S. Electric Signal Co.

Slack Adjusters. (See Brake Adjusters)

Sleet Wheels and Cutters
- Anderson Mfg. Co., A. & J. M.
- Bayonet Trolley Harp Co.
- Columbia M. W. & M. I. Co.
- Electric Ry. Equip. Co.
- Electric Service Supplies Co.
- More-Jones Br. & Metal Co.
- Nuttall Co., R. D.

Smokestacks, Car
- Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
- Amer. Rattan & Reed Mfg. Co.
- Brill Co., The, J. G.
- Columbia M. W. & M. I. Co.
- Consolidated Car Fender Co.
- McGuire Cummings Mfg. Co.

Soldering and Brazing. (See Welding Processes and Apparatus)

Spikes
- Amer. Steel & Wire Co.

Special Adhesive Papers
- Irvington Varnish & Ins. Co.

Splicing Compounds
- Westinghouse Elec. & M. Co.

Splicing Sleeves. (See Clamps and Connectors)

Springs, Car and Truck
- Bemis Car Truck Co.
- Brill Co., The, J. G.
- Taylor Electric Truck Co.

Sprinklers, Track and Road
- Brill Co., The, J. G.
- McGuire Cummings Mfg. Co.
- St. Louis Car Co.

Steel and Steel Products
- Cambria Steel Co.
- Midvale Steel & Ord. Co.
- Morton Mfg. Co.

Steps, Car
- Amer. Abrasive Metals Co.
- American Mason Safety Tread Co.
- Morton Mfg. Co.

Stokers, Mechanical
- Babcock & Wilcox Co.
- Westinghouse Elec. & M. Co.

Storage Batteries. (See Batteries, Storage)

Strand
- Roeblings' Sons Co., J. A.

Structural Steel
- Cambria Steel Co.
- Midvale Steel & Ord. Co.

Superheaters
- Babcock & Wilcox Co.
- Power Specialty Co.

Sweepers, Snow. (See Snow Plows, Sweepers and Brooms.)

Switch Stands
- Indianapolis Switch & Frog Co.
- Ramapo Iron Works

Switches, Selector
- Nichols-Lintern Co.

Switches, Track. (See Track, Special Work)

Switches and Switchboards
- Anderson Mfg. Co., A. & J. M.
- Cutter Co.
- Electric Servivce Sup. Co.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Tampers, Tie
- Ingersoll-Rand Co.

Tapes and Cloths. (See Insulating Cloth, Paper and Tape)

Telephones and Parts
- Electric Service Sup. Co.

Testing Instruments. (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
- Consolidated Car Heating Co. Co.
- Gold Car Heating & Lighting Co.
- Railwayy Utility Co.
- Smith Heater Co., Peter

Thread-Cutting Tools
- Wiliams & Co., J. H.

Ticket Choppers and Destroyers
- Electric Service Supplies Co.

Ties, Mechanical
- Dayton Mechanical Tie Co.

Tie Plates
- Cambria Steel Co.
- Midvale Steel & Ord. Co.

Ties and Tie Rods, Steel
- Barbour-Stockwell Co.
- International Steel Tie Co.

Ties, Wood Cross. (See Poles, Ties, Posts, etc.)

Tongue Switches
- Wharton, Jr., & Co., Inc., Wm.

Tool Holders
- Williams & Co., J. H.

Tool Steel
- Cambria Steel Co.
- Midvale Steel & Ord. Co.

Tools, Track and Misc.
- Amer. Steel & Wire Co.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Hubbard & Co.
- Railway Track-work Co.

Tools, Thread Cutting
- Williams & Co., J. H.

Towers and Transmission Structures
- Archbold--Brady Co.
- Bates Expanded Steel Truss Co.
- Westinghouse Elec. & Mfg. Co.

Track, Special Work
- Barbour-Stockwell Co.
- Indianapolis Switch & Frog Co.
- Ramapo Iron Works
- Wharton, Jr., & Co., Inc., Wm.

Transfer Issuing Machines
- Ohmor Fare Register Co.

Transformers
- General Electric Co.
- Westinghouse Elec. & M. Co.

Treads, Safety, Stair, Car Step
- Amer. Abrasive Metals Co.
- Amer. Mason Safety Tread Co.
- Morton Mfg. Co.

Trolley Bases
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Nat'y Ry. Appliance Co.
- Nuttall Co., R. D.
- Ohio Brass Co.

Trolley Bases, Retrieving
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- More-Jones Br. & Met. Co.
- Nat'y Ry. Appliance Co.
- Nuttall Co., R. D.
- Ohio Brass Co.

Trolley Buses
- Brill Co., The, J. G.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Trolley Materials
- Electric Service Supplies Co.
- Ohio Brass Co.

Trolley Shoes
- Miller Trolley Shoe Co.

Trolleys and Trolley Systems
- Ford Chain-Block Co.

Trolley Wheels. (See Wheels, Trolley)

Trolley Wire
- American Elec'l Works
- Amer. Steel & Wire Co.
- Anaconda Copper Mining Co.
- Roeblings Sons Co., J. A.

Trucks, Car
- Brill Co., The, J. G.
- Bemis Car Truck Co.
- McGuire Cummings Mfg. Co.
- St. Louis Car Co.
- Taylor Electric Truck Co.
- Westinghouse Elec. & M. Co.

Tubing, Yellow & Black Flexible Varnishes
- Irvington Varnish & Ins. Co.

Turbines, Steam
- General Electric Co.

Turnstiles
- Damon-Chapman Co.
- Electric Service Supplies Co.
- Perey Mfg. Co., Inc.

Turntables
- Indianapolis Switch & Frog Co.

Upholstery Materials
- Amer. Rattan & Reed M. Co.

Valves
- Ohio Brass Co
- Westinghouse Tr. Br. Co.

Varnished Papers
- Irvington Varnish & Ins. Co.

Varnished Silks
- Irvington Varnish & Ins. Co.

Varnishes. (See Paints, etc)

Ventilators, Car
- Brill Co., The, J. G.
- National Ry. Appliance Co.
- Nichols-Lintern Co.
- Railway Utility Co.
- St. Louis Car Co.

Vises, Pipe
- Williams & Co., J. H.

Welded Rail Joints
- Indianapolis Switch & Frog Co.
- Ohio Brass Co.
- Ry. Track-work Co.
- Rail Welding & Bonding Co.
- American Steel & Wire Co.

Welding Processes and Apparatus
- Elec. Ry Improvement Co.
- General Electric Co.
- Indianapolis Switch & Frog Co.
- National Ry Appliance Co.
- Ohio Brass Co.
- Rail Welding & Bonding Co.
- Railway Track Work Co.
- Westinghouse Elec. & M. Co.

Welding Steel
- Indianapolis Switch &Frog Co.

Welders, Portable Electric
- Electric Ry. Imp. Co.
- Indianapolis Switch & Frog Co.
- Ohio Brass Co.
- Ry. Track-work Co.
- Rail Welding & Bonding Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Grinders
- Wheel Truing Brake Shoe Co.

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
- Assn. of Mfrs. of Chilled Car Wheels

Wheels, Car, Steel and Steel-Tired
- Cambria Steel Co.
- Midvale Steel & Ordnance

Wheels, Trolley
- Anderson Mfg. Co., A. & J. M.
- Bayonet Trolley Harp Co.
- Columbia M. W. & M. I. Co.
- Copper Products Forging Co.
- Electric Ry. Equip. Co.
- Elec. Service Supplies Co.
- General Electric Co.
- More-Jones Br. & Metal Co.
- Nuttall Co., R. D.
- Star Brass Works

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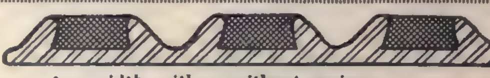

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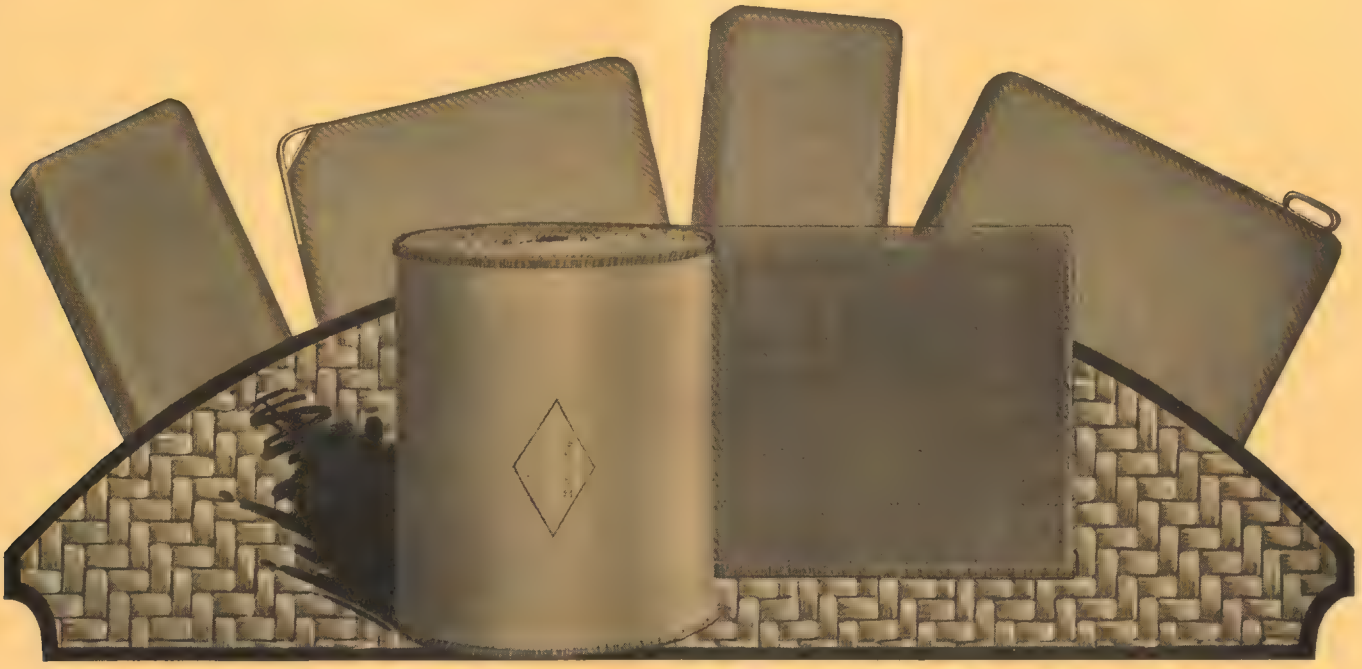

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ELECTRIC RAILWAY JOURNAL

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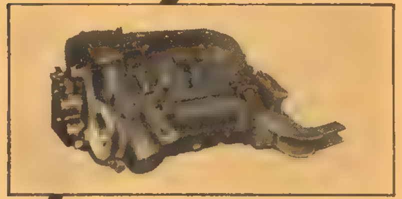

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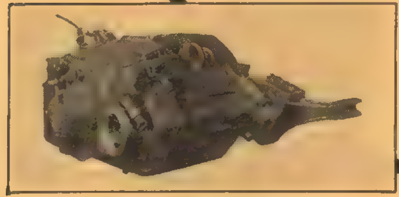

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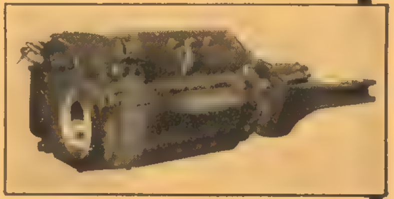

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East Pittsburgh, Pa.

Westinghouse

Vol. 60, *No.* 11 New York, September 9, 1922 *Pages* 347-378

ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE, Editor

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What the "Daily" Will Do for the Convention

THE *Electric Railway Journal* will issue a convention daily at Chicago, as part of its service to the industry. None was issued last year because there were no exhibits. The daily and the exhibits go naturally together.

As heretofore, but more so than ever, the daily will have a fourfold purpose, to wit:

1. To serve as a means of telling "conventionites" what is going to occur from day to day.
2. To enhance the value of the exhibits by furnishing up-to-the-minute information regarding them.
3. To record promptly the high spots of the proceedings of the several associations.
4. To promote good-fellowship generally.

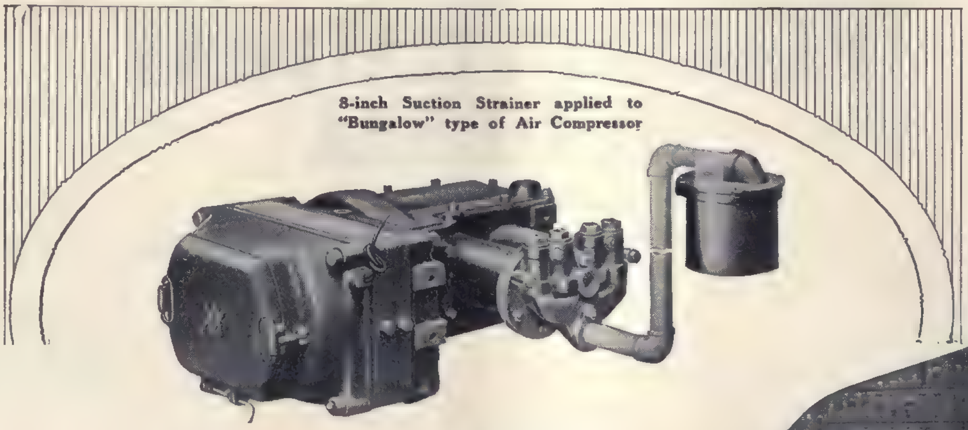
The daily will contain information as to events occurring up to the press hour, midnight. It will be distributed for assimilation with breakfast every morning.

The daily will be the clearing house for convention information. "Conventionites" are invited to co-operate this year as they have so consistently done in the past.

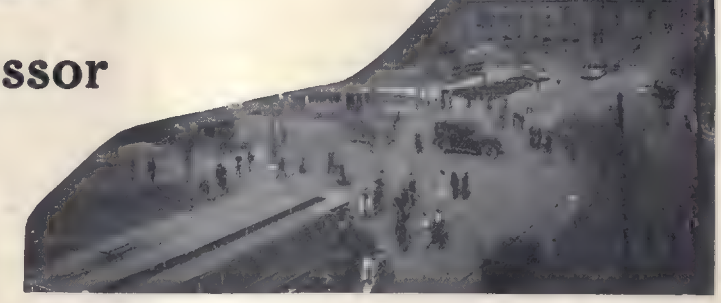
Probably few who read the daily at the breakfast table or upon reaching the pier stop to visualize the effort needed to furnish them this service. And really there is no reason why they should. The fact is, however, that a large force of editors is required even though the paper is limited in size. First-hand reports of the meetings must be prepared; exhibits must be studied; Tom, Dick and Harry must be interviewed, and in addition the paper must be edited, set up in type, proof read, printed and distributed.

This daily is the contribution of the *Electric Railway Journal* to the success of the convention.

Circulation of this Issue, 5,800 Advertising Index—Alphabetical, 42; Classified, 38, 40; Searchlight Section, 35, 36, 37



8-inch Suction Strainer applied to "Bungalow" type of Air Compressor



Give the Compressor The Protection It Deserves

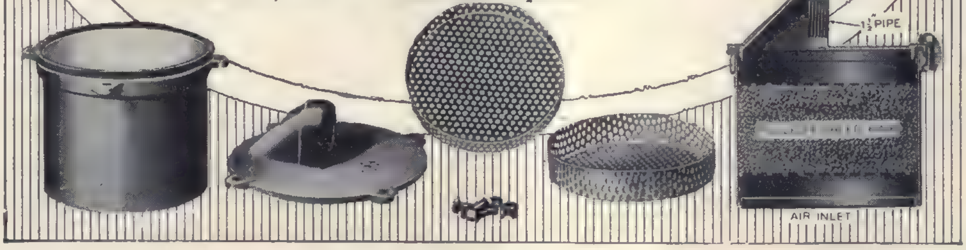
THE air compressor, as one of the most essential factors in modern railway operation, deserves adequate protection against any condition which may tend to affect its efficiency.

The Westinghouse 8-inch Suction Strainer provides positive protection against one of the commonest causes of complaint—that of dust and dirt being drawn into the compressor cylinders with the suction air.

All air used in compressors equipped with 8-inch Suction Strainers is filtered through a thick bed of pulled curled hair, thus insuring a state of cleanliness which adds materially to the life and efficiency of the compressor and reduces maintenance expense by permitting the lubricating oil to perform its intended function instead of becoming a gritty compound which cuts away the working surfaces.

The capacity of the 8-inch Strainer is sufficient to meet the requirements of any compressor having a displacement not exceeding 38 cubic feet per minute.

Descriptive Leaflet No. 2422, containing further information of interest concerning the 8-inch Suction Strainer, will be mailed on request.



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WESTINGHOUSE TRACTION BRAKES

In five seconds National Trolley Guard pays for itself one hundred times over

Every day there is liable to be this kind of a situation on a grade crossing; the car starts across the tracks and, due to bumpy road bed and high wire, the trolley jumps. A train comes into sight traveling at speed and runs down the car before the conductor can race to the back of the car and replace the wheel—

Unless National Trolley Guard is on duty. Then, when the wheel jumps, it runs on the Guard and collects the power to carry the car and its passengers to safety, and the danger is never even recognized.

When National Trolley Guard has prevented just one accident it has paid for itself one hundred times over. But it continues to stay on duty ready for service every minute of every day for years and years.

It's the cheapest kind of accident insurance — and it's the best kind because it prevents instead of repays.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

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Mansfield, Ohio, U.S.A.

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Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Squeeze more value from your trolley maintenance money

Brass (red hot but not molten) squeezed by enormous pressure through a die—that is extruded metal. Toughness, denseness, uniformity, accurate shape are literally squeezed into the metal. And you can use this extruded metal to squeeze more value from your line maintenance money.

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O-B Extruded Ear—Patented—Installed on Grooved Wire
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The lips, absolutely accurate in contour, fit into the groove exactly. The metal is tough, dense, tenacious. It hangs on. It resists wear.

O-B Extruded Trolley Armor

Above—O-B Extruded Trolley Armor, shown with one end clinched on wire. At right—Cross-section of armor installed.

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It prevents both bottom and side wear. Furnished for every style and size of wire.

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Steel Tie Company
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AJAX ELECTRIC ARC WELDER

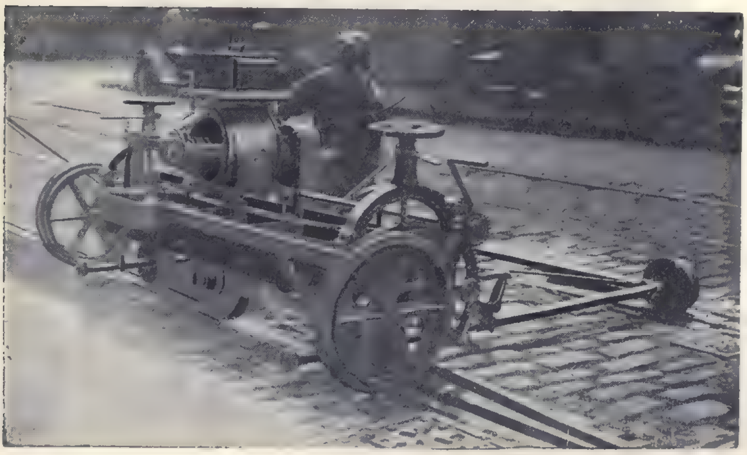
Ample Capacity at Low Voltage

It's the high capacity of this machine which makes it so especially practical for electric railway work. Designed and built by men who understand railway line voltage conditions, it does a thorough job even at the ends of long lines where low voltage is the usual thing.

With a normal output of 333 amperes at 600 volts, the Ajax is also capable of furnishing over 200 amperes at half that voltage. A switchboard attached at one end gives the operator absolute regulation of current at all times.

The result, with the Ajax Welder, is a deeply-penetrating weld, smooth, uniform and durable, no matter how poor the voltage conditions are.

We also manufacture a complete line of track grinders



Write us for current prices

Railway Track-work Co.
3132-38 E. Thompson St.
Philadelphia, Pa.

AGENTS:
Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
P. W. Wood, New Orleans

Type RM-96 Golden Glow Headlight

Type T Golden Glow Headlight, 9-in. Reflector for city and suburban service.

Type T Golden Glow Headlight, 14-in. Reflector for high speed interurban service.

There's a Golden Glow for every car and every character of service

KEYSTONE

Car Specialties

Check off your wants, then write for complete data sheets

- ☐ Keystone Air Sanders
- ☐ Keystone Air Valves
- ☐ Golden Glow Headlights
- ☐ Illuminated Destination Signs
- ☐ Keystone Steel Gear Cases
- ☐ Safety Car Lighting Fixtures
- ☐ Keystone Motormen's Seats
- ☐ Faraday Car Signals
- ☐ Keystone Trolley Catches
- ☐ Shelby Trolley Poles
- ☐ Samson Cordage
- ☐ International Fare Registers
- ☐ Fare Register Fittings
- ☐ Keystone Cord Connectors
- ☐ Keystone Rotary Gongs
- ☐ Standard Trolley Harps
- ☐ Standard Trolley Wheels
- ☐ Automatic Door Signals
- ☐ Keystone Trailer Connectors

Golden Glow Headlights are fitted with this Type L Focusing Device. Easily operated with a screw driver.

When you buy headlights—regardless of type of car and service—buy the reflectors. For no headlight is a real headlight unless it has a real reflector. Golden Glow Reflectors are permanent reflectors. They never rust, and they throw a more penetrating and non-blinding beam of light.

Watch our advertisements in the Electric Railway Journal for announcement of our exhibit at Chicago.

Electric Service Supplies Co.

Manufacturers of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Streets	50 Church Street	Monadnock Bldg.

Branch Offices: **Boston, Scranton, Pittsburgh**

Canadian Distributors:
Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver

Type AT-R Arc Weld Bond

Round steel bar terminals, Easy welding, High conductivity

Rail Bonding satisfaction easily achieved

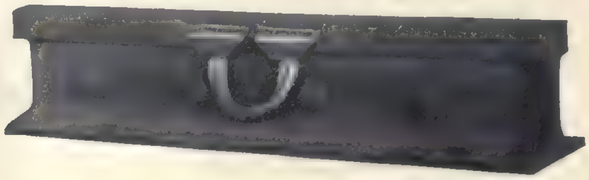
ERICO Rail Bonds satisfy every desirable rail bonding requirement. The many types, lengths and capacities enable you to choose a bond just suited to your conditions.

For extended bonding the ERICO Brazed Bond cannot be surpassed. Cheap installed cost, long life and the highest conductivity possible make this bond the standard among big electric railways. Brazed Bonds can be applied on head of rail, or web of rail, with ease and certainty of results.

For "pickup" bonding, where the distance between bond applications is long, the ERICO Arc Weld Bonds will render efficient service at a very moderate installed cost.

Type ET Brazed Bond

For application to the head of rail of 60 lbs. to the yard or over.



Type AT-F Arc Weld Bond

With heavy forged terminals electrically brazed to the copper.

Take advantage of our 18 *years' experience in solving your rail bonding problems.*

The Electric Railway Improvement Co.

Cleveland, Ohio

ERICO RAIL BONDS

First—Collect Your Passengers!

Fare collection is important—but *passenger collection* is what makes it possible.

First—collect your passengers. If it is *done right*, your fair collection will take care of itself.

And by "done right" we mean done almost *automatically*—done so that the conductor can keep his mind concentrated on getting the fares from all the riders and getting the car away on the fastest possible schedule —

Instead of opening or closing doors by hand power or watching to see that no passenger is caught in a door jam or worrying about the "go ahead" signal and such like.

For *passenger collection* can be reduced to the mere flip of a wrist and the finger-pressure on a button—and full safety for every passenger assured—and full platform width instantly offered the rush hour crowds —

— and full concentration can be given to every nickel, dime, penny and ticket and transfer when your cars are equipped with

The National Pneumatic "Rushour" Line

Door and Step Control
Motorman's Signal Lights
Door and Step Operating Mechanisms
Safety Interlocking Door Control
Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
Originator and Manufacturer
50 Church St., New York
Edison Bldg., Chicago
Works: Rahway, N. J.

Acres of Graded Ties

Every International Tie is a Sound Tie

NO single period in the production of treated cross ties is of greater importance to its ultimate life than the period of seasoning.

The great care exercised in following International Ties from the stump to the retort is, in large measure, responsible for the soundness, uniformity, and high quality of International Products. The ties are removed quickly from the decay producing conditions of the woods, transported to the railway right of way where they are inspected, graded and shipped quickly to the plant for seasoning.

The one hundred twenty acres of ground, free from all vegetation, and a seasoning capacity of two and a half million ties of our Texarkana Plant is representative of International tie service.

Our methods are adapted to promote early seasoning with minimum danger of decay. All International ties are seasoned under the immediate supervision of trained men who are thoroughly familiar with the characteristics of the timber in this territory.

The tie that lasts longest is least expensive

International Creosoting and Construction Co.

General Office—Galveston, Tex.

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

Where There's "Smoke" There's *Wear*

A BLUEISH cloud of smoke comes up from under the car.

"Hot box?" says the Inspector. "No, I guess not. 'Must be the compressor smoking again."

It happens often—too often. It can be stopped.

Examine the cause.

Either it is due to

1—Worn or ill-fitted piston rings,
or
2—Wrong kind of lubricant.

The first can be *relieved* easily by your mechanical department.

But a *permanent* cure is our job. We've cured it, or prevented it, on thousands of cars.

Compressors lubricated with TEXACO ELECTRIC COMPRESSOR OIL don't smoke. This splendid lubricant holds compression so well that no excess oil is carried over to vaporize or cause that blueish cloud of "smoke."

This condition of perfect lubrication prevents wear as well as carbon in the cylinders. When air compressors are imperfectly lubricated the rings wear; oil leaks past—carbonizes. Carbon scratches rings and cylinder walls—more wear; more oil leakage and continual loss of compression.

On the other hand in a Texaco lubricated compressor the rings don't wear; they fit snugly after many miles of service. THAT means an efficient air compressor — one that delivers the full amount of air with each stroke.

You can tell a Texaco lubricated air compressor by its action. A few crisp beats and the air receiver is filled up to the required pressure. Your motormen don't have to wait for the air—it's there when they need it.

Remember this:—A leaky air compressor is like a boy filling a tank with a leaky bucket. He can do it but it takes more trips to get the work done.

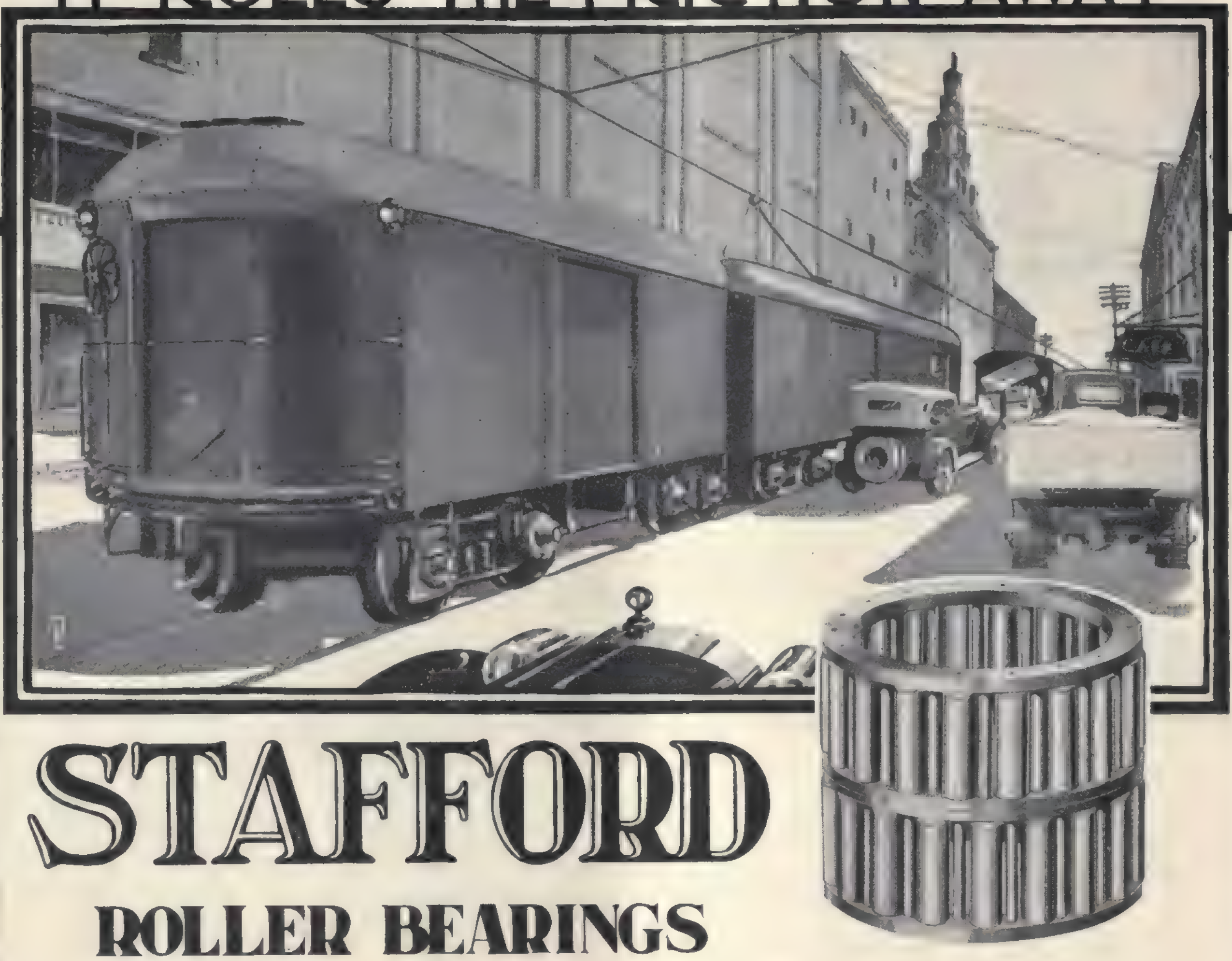
TEXACO ELECTRIC RAILWAY COMPRESSOR OIL is correctly refined for the service; made in two grades—one for winter, one for summer.

Both are tried and tested.

Let us quote you some splendid records on many Roads in many States. At the same time our Texaco Lubrication Engineers will be glad of the chance to aid you in securing higher operating efficiency through the selection of the right lubricant—in the right amount.

There Is a Texaco Lubricant for Every Purpose
and they are unexcelled for the Lubrication of Street
Railways, on Rolling Stock, in Power Plant or Shop.

THE TEXAS COMPANY
DEPT. R.J. 17 BATTERY PLACE. NEW YORK CITY
HOUSTON - CHICAGO - NEW YORK
OFFICES IN PRINCIPAL CITIES



"IT ROLLS THE FRICTION AWAY"

STAFFORD

ROLLER BEARINGS

In Electric Railway Service

They cut power requirements in half because *they eliminate journal friction.* They positively prevent hot boxes because *there is no friction to develop heat.* They end lubrication difficulties because *there is no heat to destroy the oil.* No waste or "dope" required. Single application of lubricant sufficient for from three to four years continuous service.

And they have the endurance—an inherent stamina—that makes them equal to every requirement on steam and electric railways.

GUARANTEED FOR TWO YEARS

Stafford Roller Bearings are guaranteed for two years from date of application. They should outlive their guarantee by ten years. They can be applied to all A.E.R.A. and M.C.B. Standard equipment, including trucks now in service. Literature upon request.

These bearings will be demonstrated at
A.E.R.A. Convention, Section B, Space 68.

STAFFORD ROLLER BEARING CAR TRUCK CORP'N.
LAWTON, MICH.

Bates Steel Poles

a sign of progress that catches the banker's eye

Quite recently, we have found that Bates Steel Pole lines are known outside the utility fields. Their qualities of strength, permanence, and economy are an important factor to bankers dealing in utility securities and to individual investors.

Progressive management, complete up-to-date equipment, permanence of physical property, and high grade maintenance of property are things of vital importance to the security holder. Good will of the communities served is also becoming of increasing importance.

Bates Steel Poles used for distribution and transmission are evidence to bankers and security buyers that economy, permanence, good will, are being provided by an efficient management. The detail of poles and pole line construction is being noticed by many people outside the ranks of utility executives and engineers.

They Outlive the Bond Issues that Buy Them

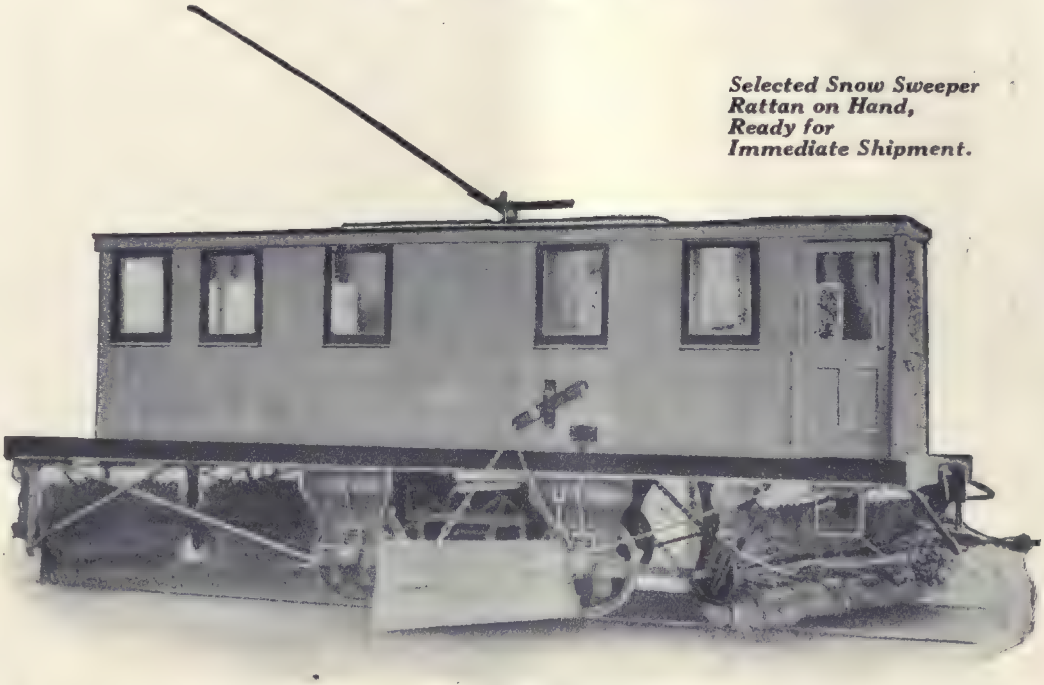
Ask us for the complete story, and engineering data if you wish it.

Bates Expanded Steel Truss Co.
208 So. La Salle St., Chicago, Ill.

District Sales Offices in All Principal Cities

BATES ONE PIECE EXPANDED STEEL POLES

Snow Fighting Equipment



Selected Snow Sweeper Rattan on Hand, Ready for Immediate Shipment.

Standard Single Truck, Steel Underframe Long Broom Sweeper

Approximately ninety-five per cent of all the electric snow sweeping equipment, which is used in the United States and Canada, is of McGuire-Cummings make.

The car illustrated here is one example. The brooms are so arranged that they will clean both rails ahead of the car; the side plows will clear 4 ft. 0 in. outside of rails.

It requires two 25-hp. motors to propel the car, and one 25 to 40-hp. motor geared to drive brooms at 300 to 350 r.p.m.

Blueprints and specifications will be submitted on request.

End view of Standard Single Truck Sweeper.

McGUIRE-CUMMINGS MANUFACTURING CO.

GENERAL OFFICES
111 WEST MONROE STREET
CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars, Snow Sweepers, Electric Locomotives.

Saving Money on Lubrication

"HOW much per gallon?" asks the inexperienced buyer. "I want to save money."

"How much per service unit?" inquires the practical purchaser of lubrication. "That's what I must know to determine true costs."

And which is right? Can service be measured in gallons? No more than wages can be regulated by the *size* of the employe, instead of his ability!

Street railways do not use oil, but *lubrication*—the service obtained from oil. The value of the oil must be gauged by its contents in lubrication units.

There has never been a question of Galena Oil quality. It is universally conceded to be the best. There has been too much proof accumulated through comparative tests with other lubricants to permit any reasonable doubt of the superior lubricating quality of Galena Oils.

Yet there are instances where price per gallon appeals to the purchaser as the deciding factor in buying lubricants, without consideration of the *service* obtained from the gallon.

While the cost of lubrication, compared with other maintenance costs in street railway operation, is a small item, its influence in regulating other expenses is most important. Whenever and wherever used, cheap railway lubricants have given inferior service. The cost of repairs and replacements made necessary through their deficiencies, if added to their first cost, would make the price per gallon surprisingly high. The value of the time lost with hot boxes and cars out of service, still higher.

The type of service exemplified on the hundreds of electric railways under Galena lubrication should prove a safe and reliable guide for the purchaser. A comparison of the results obtained, with those on railways using other lubricants, must stand as convincing proof that Galena Oils are not only the most efficient but the most economical as well.

*"More miles to the pint;
Better service to the mile."*

Member American Electric Railway Association 1922

Galena-Signal Oil Company

New York • Franklin, Pa. • Chicago

and offices in principal cities

In the interest of economy and better service

Renew with G-E Parts—
Because:

—The cost of making repairs is so largely labor that economy dictates the use of only the best materials.

—G-E Renewal Parts are made of the same materials, with the same tools, on the same machines, and often by the same men who made your original parts. They are *exact duplicates*.

—The use of duplicate parts reduces the number required to be kept in stock. G-E Renewal Parts Catalogs enable you to select just what you need.

—Naturally, as maker of your G-E equipment, we are most interested in its continued satisfactory performance. G-E Renewal Parts keep up the original quality.

General Electric Company

General Office
Schenectady, N.Y.

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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 60 New York, Saturday, September 9, 1922 Number 11

The News Element in Convention Exhibits

THE most attractive exhibits at the approaching Chicago convention will be those which feature the recent advances in their respective fields. In other words, the news value of an exhibit is a factor in its effectiveness. The exhibitors will want to make the most of this fact and to coach their representatives carefully as to the interesting features which are brought out in their exhibits. It is true that a determined effort will have to be made in many cases to bring out the elements of novelty, especially where it seems that only standard products can be shown. However, even in such cases there are advances in methods of manufacture, in details of design, in improvements in raw materials and in the finished output which may well be featured.

Some years ago it was suggested that prizes be offered for originality and instructiveness in convention exhibits. The practical difficulties in the way of making awards which would appear to all as fair prevented the carrying out of the idea. Prizes or no prizes, however, there is real competition among the exhibits for attention and, without going to extremes to attract this attention, exhibitors will do well to prepare to meet the competition.

A Good Example in Railway Shop Lighting and Ventilation

HIGH-CLASS work cannot be done continuously in a gloomy shop. The psychological effect of such a shop is depressing and in addition good workmanship requires proper illumination. Electric railways are not building many new shops at the present time, but programs for rehabilitation are going forward, and in these the value of additional windows and the arrangement of shop tools to secure efficient illumination should not be lost sight of.

A good example of the trend of modern shop building construction is afforded in the new repair shop of the Atchison, Topeka & Santa Fé Railroad at Albuquerque, N. M. The most conspicuous of the new features is the large amount of glass construction used. The sides of the building present the appearance of a solid sheet of glass. The glass is placed in a plane 4 in. beyond the face of the structural members, which simplifies the construction and protects the steel work from outside exposure. The folding doors through which the tracks pass for entrance of cars to the pits and overhauling section have glass for nearly their entire length. A ventilating sash is provided in each main section of steel sash. Illumination from the sides is supplemented by a large number of A-shaped skylights, the upper half of which are arranged to open and close mechanically. Ventilation and illumination in an unusual degree of excellence are thus afforded, and throughout the construction it is evident that the comfort and convenience of the workmen have been considered as most essential. This is certain to be reflected in better workmanship and greater efficiency. Many existing electric railway shops could very profitably be brightened up by substituting steel window sash and glass for much of the present brick in the walls.

Honest Differences of Opinion in Indiana

LED by Mayor Quick of Muncie and seconded by Mayor Shank of Indianapolis a drive is on among the Mayors and city attorneys of Indiana to obtain recruits in a campaign to secure amendments to the Public Service Commission law of the State at the coming legislative session. Not even the Mayors, or such of them as have expressed opinions, are agreed as to what they consider should be done to correct the grievances against the commission from which the cities are supposed to be suffering, but the camp does seem to be divided into two factions. One faction is for the repeal of the law and the return to home rule. The other is opposed to the repeal of the basic law, but is urging the need of amendments designed to open the way to a stronger presentation of the "case of the people" than under the present operation of the law. Stronger presentation of the case of the people would seem to be a matter for the exercise of talent rather than a subject for legislation, but that is neither here nor there now. So much for the political agitation.

This was a situation upon which the Indiana Public Utility Association was not inclined to look with equanimity. If organization meant strength to the politicians masquerading as mayors, then organization certainly meant strength to the association through its ability to reach investors who would likely suffer a shock to their confidence and perhaps a real loss in their investments if the commission act became the football of politics. In consequence a plea was addressed to investors in Indiana securities residing within the State to do what they could to discourage any tampering with the law that would tend to injure the future stability of the public service industry. This seemed only logical to the association. With it self-preservation was still the first law of nature.

Now come the bankers. They are no more prone to look feelingly upon the present political agitation as conducted by the Mayors than are the utility managers acting through their associations. The investment bankers hold to the opinion, however, that the action of the association in seeking support from security holders is not likely to accomplish the end which the association has in mind, but if persisted in is much more likely to do harm than good. Contrary to the general opinion that investors watch their investments carefully, the experience of the bankers has been that most investors buy on the representation of the issuing house and put the securities away and forget their ownership between interest or dividend periods. As the bankers see it, the only result of urging the investor to political action in his own behalf is to create distrust in the mind of the investor about the safety of his investment and to cause a dumping of securities on the market. Even where the investor does not sell, the opinion of the banker is that he becomes an increasingly hard prospect for the future. In short, as the banker sees it, the association is playing indirectly into the hands of the politician by its appeal.

The association must have felt that the political agitation over the commission was assuming serious proportions, but it is to be hoped that its proximity to the participants in the campaign makes the agitation appear to the association to be much more formidable than it really is. From a distance, the campaign would seem to be merely another cheap bid for political preferment that is not likely to manifest itself in any tangible form. This is the charitable view of the situation. It would, indeed, be a terrible commentary on the common sense of the people of Indiana if this should prove not to be so.

The Transfer as a "Necessary Evil" May Not Be Always Necessary

OPINIONS on transfers have gone through several cycles. The origin of the transfer in most cities, at least of the universal transfer, dates from the time of the consolidation of the lines into one urban system. It was often included in the franchise as one of the conditions exacted of the company for the consolidation, or was later added to the requirements by legislative enactment.

After the general adoption of the universal transfer, traffic rapidly increased, and much of this growth, due to many causes, was attributed to the transfer. The manager of one large electric railway system, writing in this paper during 1901, said: "The liberal system of transfers adopted and in force during the last eight or nine years has increased the earning power of the company more than any other one cause, the introduction of electricity as a motive power not excepted."

Latterly, the transfer has lost some of its pristine favor. In some cities where an adequate increase in fares could not be secured in any other way, a charge has been made for transfers, or they have been abolished altogether where this has been possible. Yet while not as popular as it once was, the transfer still has many defenders from the point of view that it simplifies questions of routing, particularly rerouting. Otherwise, where a change in routing meant an additional transfer, it would probably be opposed by those whose fares would be increased thereby. While there is some reason for this argument, no great difficulties have been experienced in those cities where a charge for transfers has been made. Now, where the pass is used, the transfer is going further into desuetude. In fact, one important advantage of the pass is that it makes the transfer unnecessary to those who use the pass, and this is an advantage to both passenger and company.

While much thought has been put on the design of transfer it remains a nuisance, retained only because no substitute has been found for it in fare collection systems other than the pass, and the use of that is limited. Should it ever be possible to abolish the universal free transfer entirely, it would go to its demise "unwept, unhonored and unsung."

Sixty-eight Years of Service to the Public

THE sixty-eighth annual report of the Brooklyn City Railroad Company, covering the fiscal year ended June 30, 1922, and recently issued, seems to merit more than casual attention in these days of Mayor Hylan's hectic statements concerning the obsolescence of street railways. It must be considered remarkable that a street railway has so long continued its corporate existence, dating its origin almost from the very beginning of rail transportation enterprises in New York City. From its record, who can doubt that the company has fulfilled and is continuing to serve a distinct public need, when such a record is at hand?

This company has passed through practically every phase of street railway construction and operating methods beginning with the bobtail horse cars on stringer rails and thence down to the present electric car running on standard girder rail tracks. It has had its share of strike troubles also, and the recent strike of 1920, which alone entailed a loss of $1,000,000, has not seriously affected its financial position. It may also be remarked that the Brooklyn City company is one of the few underlying companies forming a part of the Brooklyn Rapid Transit System which has not been forced into receivers' hands during the recent period of depression, although it has been obliged to discontinue the payment of dividends.

The financial statement above referred to indicates a substantial profit for the year reported upon, and there seems to be every reason to believe that this young-old company will continue many more years of faithful service to the residents of Brooklyn.

Sept. 9 Is a Significant Day in Power Circles

FORTY years ago today electric service was established from the Pearl Street station in New York City by Thomas A. Edison. The fortieth anniversary of this date is being utilized by the lighting and power interests to emphasize to the public the significance of this event and of the development which has since occurred.

Edison saw in the lighting field a ripe market for electrical power. He planted his first important station when the opportunity seemed greatest; that is, in downtown New York. When this plant was designed the high-speed steam engine was a crude affair. Edison wanted to get along without belting between the engines and the dynamos to save space on his expensive site. He required a satisfactory high-speed engine, and he got it. The building of this station, therefore, stimulated the development of the high-speed engine and the effect reached the boiler room also. The prospective electric railways benefited by this.

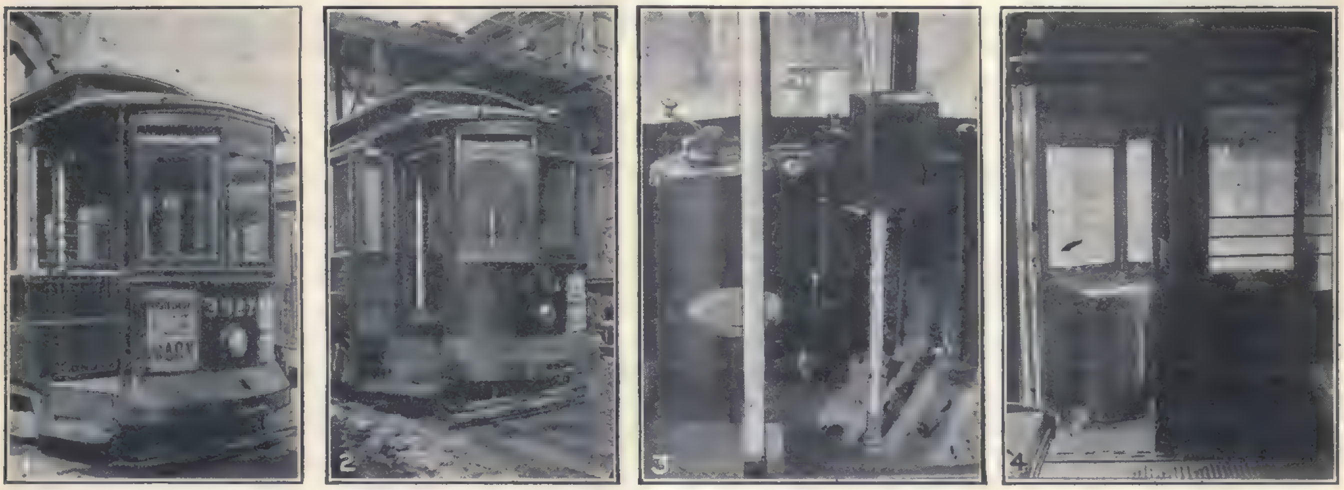
In the Pearl Street station there were also the so-called Edison "Jumbo dynamos," huge bipolar affairs, crude in design as judged by present-day standards, but sturdy and, for the time, reliable. They were of such capacity as to absorb the output of engines rated at 175 hp. each. These machines marked an advance in their field similar to that in the engines and boilers.

The Pearl Street station had nothing to do with electric railways, for these did not exist when it was started. But it paved the way for electric railways, because this development was not possible until cheap and plentiful electric power should become available.

Brooklyn Remodels Double-Truck Cars for One-Man or Two-Man Operation

Full Safety Devices Are Installed and Platforms Remodeled to Provide for Efficient Handling of Passengers and Easy Operation by One Man—Work of Reconstructing and Remodeling Done Under Contract

ONE-MAN operation in Brooklyn has been further extended during the past few months by the placing in service of fifty remodeled double-truck cars. In addition contracts have been let for the remodeling and equipping of 175 cars arranged for either one-man or two-man operation. The work of reconstructing and remodeling the cars now in service was done by the National Safety Car & Equipment Company, under contract. A building suitable for carrying out the work of reconstruction was furnished by the railroad, but all equipment, other materials and the labor necessary for the reconstruction were furnished by the equipment company. The same procedure is being followed for the 175 cars now being remodeled.



NOS. 1 AND 2—PLATFORM ARRANGEMENT OF OLD AND REMODELED CARS. NO. 3—ARRANGEMENT OF EQUIPMENT ON PLATFORM OF REMODELED CAR. NO. 4—ACCELERATOR TYPE BULKHEAD

The cars already remodeled were some of an order purchased in 1902. They are 37 ft. 1 in. over bumpers, have a seating capacity, with longitudinal seats, of thirty-two and have Brill maximum traction trucks. The equipment consists of two Westinghouse 93 motors, K-11 controllers and Westinghouse air brakes. As can be seen in the view of one of this type of cars before remodeling, they originally had semi-inclosed vestibules and iron gates with permanent steps. The bulkhead was provided with a single sliding door at the left-hand side of the bulkhead. In the remodeling the bulkhead was entirely removed and the bulkhead door was used for inclosing the side of the car platform which was permanently closed. The front vestibule part of the car was not changed, but, of course, the entrance side was remodeled so as to provide for the installation of folding doors and steps.

By referring to the plan showing the platform arrangement, it will be noted that the arrangement of apparatus and other construction details conforms very closely to that used for the standard Birney safety cars. Four upright white enameled stanchions were added, two of these being in what was formerly the bulkhead, the other two being on the platform. Of these latter, one is at the right-hand side of the entrance steps and the other, near the center of the platform, is used for the fare box support. The doors and steps are of standard safety car design, arranged so that the doors open outward. With the car at a stop and the doors open these, of course, project outside of the car body. In an endeavor to reduce the number of accidents which occur from trucks running into these doors while they are open, a conspicuous stop sign, consisting of red letters on a white background, has been painted across the panel of the door. Additional signs used to direct passengers consist of a sign lettered on the side panel, just to the rear of the entrance, reading "Please Have Exact Fare Ready"; the upright part of the step is lettered "Watch Your Step," and on the right front end just underneath the window are the words "Front Entrance." The platform arrangements are the same at each end of the car as is necessary for the double-end operation which is used. Feralun anti-slip treads are used on the platform edges at the step and also at the entrance to the car body formerly occupied by the bulkhead.

The two pneumatic engines used for operating the doors are installed on the top flooring of the platform just ahead and to the left of the position formerly occupied by the bulkhead. They operate the doors and steps through connecting levers and rods installed under the car platform. A substantial wood housing covers the door engine; the top of this box is flush with the floor of the car body, so that in appearance it looks like an extension of the car flooring. A stool for the operator is located just to the front of this door engine housing. The position of the platform controller was changed by moving it closer to the left side of the platform and safety devices forming a part of the standard equipment were added.

The original circuit breaker located over the operator's head was continued in use. This is a General Electric type MQ. The necessary trip which constitutes a part of the standard safety car equipment was added.

These cars had air brake equipment before the remodeling was undertaken. This was not changed except as was necessary for the installation of the new air brake valve and emergency valve. Of course, the piping to the brake valve was changed and additional piping added as is necessary for this equipment. A foot valve for maintaining the circuit in parallel with the dead man's handle was also added. Additional foot switches for making contact for the electrical transfer registers were installed just to the right of the controller. The original location of the hand brake staff was changed. This was moved forward closer to the dash and slightly to the right to give additional platform space, and a drop type of handle was also added.

"Stop" Sign Displayed When Doors Open

The curtain arrangement for inclosing the operator is essentially the same as that of the standard Birney safety cars but, of course, different size curtains were necessary. The view showing the curtains in their closed position gives a ready conception of their size and arrangement. The edges of the curtain, which come together at the fare box stanchion, overlap so as effectively to screen the operator from any light, but an opening is left of sufficient size so that he can see the doors and steps through this and also have a good view of the fare box. The bottom corner of the left-hand curtain is also cut off at the fare box location. The curtains are supported by rings which slide on ½-in. pipe construction at the top. The front curtain comes out at an angle from the corner post so as to give the operator a clear view through the window on the right-hand side of the vestibule.

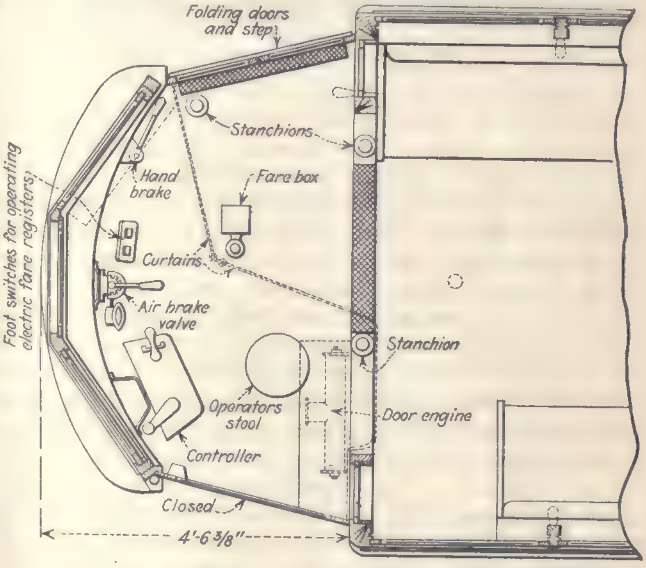
Originally these cars had but one trolley pole and were not provided with trolley catchers. With one-man operation trolley catchers were essential, and in order to provide for their efficient operation an additional trolley stand was installed. The only change made on the interior of the car body was to install push buttons for the operation of the Consolidated Car Heating Company buzzer system. Push buttons were installed on the window posts between each pair of windows and also at the end of the car alongside the last end window. This makes a total of twenty push buttons per car.

In the views showing the platform equipment, it will be noticed that a new type of fare box is shown. Several of the one-man remodeled cars were equipped with this type of fare box for trial and its operation is so satisfactory that its use will be extended to the one-man, two-man cars. A somewhat detailed description of this fare box, or coin switch as it is called, is given on page 356 of this issue. Electrically operated fare registers are used on all cars of the Brooklyn Rapid Transit Company and the Brooklyn City Railroad Company that have been purchased or rebuilt since 1912. The use of this coin switch relieves the operator from the duty of pushing a foot switch to register each fare, as the coin in passing through this new type of coin switch automatically makes the electrical contact, so that the fare is automatically registered on the International Fare Register as it is deposited by the passenger. The operator is also relieved from the added duty of having two totalizers to keep a record of in his report. In the equipment now in service, the operation of these coin switches is interlocked with the reverser on the controller, so that they are cut out of circuit and are rendered inoperative whenever the reverser drum is in its central position.

The operation of the cars reconstructed for one-man operation proved so successful that plans were made for remodeling additional cars. In this work of reconstruction, however, provision was made for either one-man or two-man double-end operation, so that the cars can be used with two men during the peak periods if found desirable. With the car arranged for one-man operation the operator controls the doors and steps at both front and rear of the car. This control is selective; that is, the door control devices and apparatus are such as to provide for any one or all of the following schemes of door control as may be selected by the operator:

First, the opening and closing of the doors at the operator's right at the forward end of the car. Second, the simultaneous opening and closing of the doors, both at the forward and rear ends of the car on the right-hand side, and third, the simultaneous opening and closing of the doors at all four corners of the car.

The operation of the doors for any of these schemes is accomplished by manipulating electric switches of the plunger or push-button type, so as to set up the desired combination of electric circuits, and by the movement of the motorman's brake valve handle to a position or positions that will by air pressure cause the operation of an electric switch, so as to close the circuit for the opening of the doors only with brakes applied and will open the circuit permitting the closing of the doors when the brakes are released.



Plan of Platform of One-Man Car

The door control devices also provide that when operated as a two-man car, the operation of the doors at both the right and left of the forward end of the car and the left-hand door at the rear of the car will be accomplished in the same manner as for one-man operation. The operation of the rear right-hand door only is controlled by a separate door-operating device, which is entirely independent of the operation of the controller and brake valve on the opposite end of the car, except in the event of an emergency application of the brakes. All doors when closed are held closed by air under compression in the door operators except when there is an emergency application of the brakes due to the movement of the emergency valve piston, at which time only atmospheric pressure is on the door-operating device.

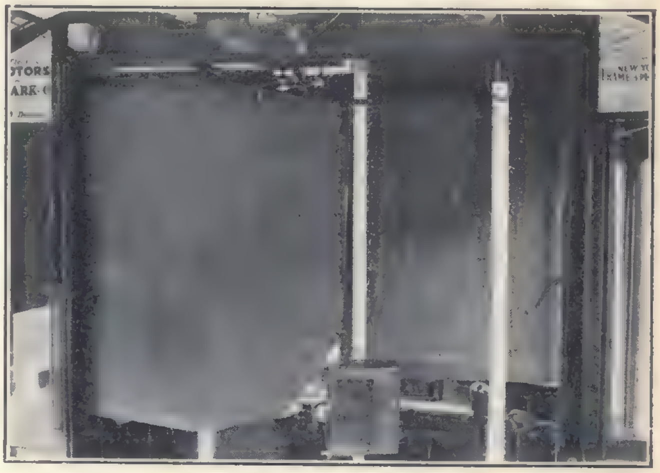
The 175 cars being reconstructed for one-man two-man operation are of several different types with variations in construction details. Some were originally provided with portable vestibules, others with permanent vestibules. Most of the cars have what is known as the accelerator type of body-end bulkhead; that is, with the door located at one side of the bulkhead. This necessitated the removal of the doors and that portion of the bulkhead containing the door pockets, leaving only the narrow frame bulkhead at each of the four corners.

An accompanying illustration shows the general plan on which the cars are reconstructed. Some of the essentials provided for are completely closed vestibules, folding doors and steps in all four corners of the car, a double pair of folding doors and steps provided at each end at the motorman's right, controlling the double passageways, and a single pair of folding doors and steps at the diagonally opposite corners.

To provide as much room as possible for the motorman and for entrance and exit passageways, each platform has been lengthened approximately 18 in. and is also extended in width. The folding doors and steps are operated by engines of the Consolidated Car Heating Company's differential type, located over the respective door headers.

The existing type K 11 controllers are used with the addition of Safety Car Devices Company's operating devices, which provide safety features so as to interlock the operation of the doors and the operation of the brakes and controller. The controllers are relocated. This also involves the moving and lengthening of the controller cables.

Existing hand-brake take-up devices are used, but these are moved forward to a new position. Hand-brake staffs are cut off at a point below the present brake-handle ratchets and a stub end with square wheel-fit and with thread and nut is welded onto the staff. A 12-in. horizontal hand-brake wheel is substituted for the existing lever type of handle.



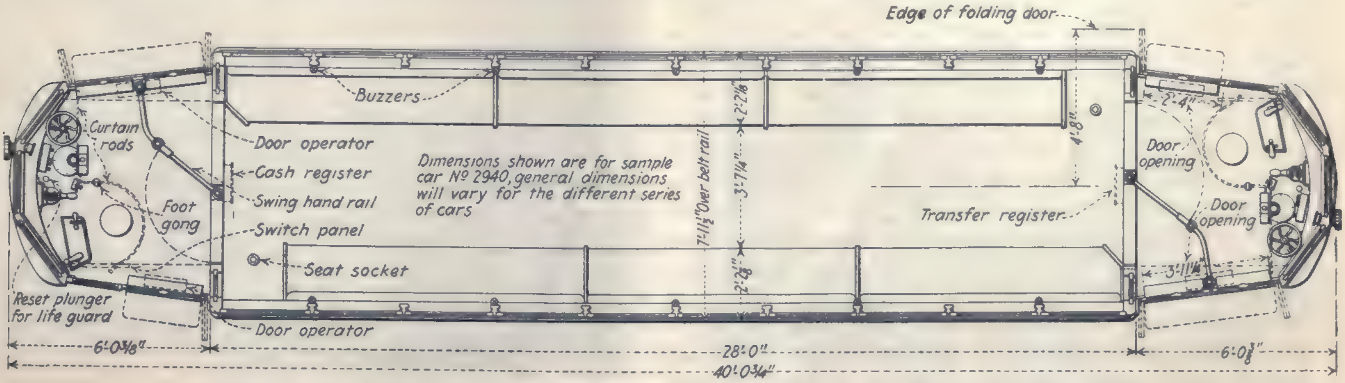
CURTAIN ARRANGEMENT ON RECONSTRUCTED CARS

The cars originally had but one trolley stand. This has been relocated and an additional trolley stand, base and pole complete, has been installed. Trolley catchers have also been added. The original equipment of Arthur power saving recorders and conductors' valves were relocated on account of the removal of certain portions of the bulkhead to which this equipment was attached.

As referred to in a previous part of this article, two electrically operated registers and coin switches are used. This equipment also includes toggle switches installed in controllers so as to interlock the register circuit with the operation of the reversers and foot switches for the operation of transfer registers, also key switches to transfer the control of register operation from the motorman to the conductor when the car is operated as a two-man car. A complete buzzer signal equipment with two buzzers and ten push buttons has also been added.

The conductor's signal to the motorman, used when cars are operated as two-man cars, is made by means of the existing bell and cord system except that the pull handles are relocated in positions convenient to the conductor. The corners of longitudinal seats at the diagonal corners of the car are cut off to provide greater space, and a finished paneling is also provided at the end of the seat. Stanchions and railings of 1-in. standard black pipe are provided as shown in the accompanying illustration. Motorman's curtains are also installed with provision so that these can be strapped back when not required as a screen.

Safety devices and door control equipment are provided to produce the following results: When operating as a one-man car all doors controlled by the operator



PLAN AND PLATFORM ARRANGEMENTS OF ONE-MAN TWO-MAN CAR FOR DOUBLE-END OPERATION close before the brakes are released. When operating as a two-man car all doors controlled from the forward end of the car close before the brakes are released. When the car is stopped through the normal operation of throwing off power and making an application of the brakes, the doors controlled from the forward end of the car open simultaneously and only with the brakes applied.

When an emergency application of the brakes is made due to a rupture or opening of the emergency pipe to atmosphere other than through the emergency port in the motorman's brake valve, power is automatically cut off by the opening of the circuit breaker through the action of an air cylinder and piston.

When an emergency application of the brake is made due to the functioning of the emergency valve, the closing cylinders of the door engines automatically open to atmosphere so that there will be only atmospheric pressure in both the opening and closing cylinders, thereby permitting the doors to be opened by hand. At the same time sand is applied to the rails automatically through the operation of air sander valves. The air supply for the operation of the sanders is obtained from a sander reservoir.

Provision is also made whereby if the electric current supply for the operation of the doors is for any reason interrupted and it is undesirable to make an emergency application of the brakes, the doors at both front and rear ends and at the right side of the car can be readily opened manually.

With the reconstruction of these 175 cars to permit one-man two-man operation, in addition to the 206 Birney type one-man cars and the fifty double-truck one-man cars now in operation, there will be a total of 431 one-man cars in use on the surface lines in Brooklyn.

Group Insurance as Used by Railway Companies

Twenty-one Thousand Electric Railway Employees Now Carry About Twenty-one Million Dollars of Group Life Insurance—Most Popular Forms of Policy Described

By WILLIAM F. CHAMBERLIN
Superintendent Group Department, Travelers' Insurance Company

THE need for life insurance and for accident and sickness compensation is universally felt by transportation employees as they generally lead lives of continual, though of safeguarded, hazard. Group life, accident and sickness insurance supplies the answer. It differs from association benefits in that the entire responsibility and detail work and service are shifted from the association or company so insuring to an insurance company. Other points of note are that it can be had at rates lower than any other form of insurance; that its benefits may be secured for employees only with the consent and co-operation of the employer, and that it wins the good will of employees through a policy of liberality that is at the same time one of good business.

As explained in the issue of this paper for Feb. 11, 1922, an employer must have fifty or more workers before he is eligible for group life insurance, or twenty-five employees before an old-line company will grant him a contract for group accident and sickness insurance. Group life requires no medical examination, and there is usually no limitation on age, but a probationary period, such as three or six months of service, is generally set before an employee may be included in the group covered. The smallest amount for which an individual worker may be insured is $500, and the largest amount is $5,000. Generally the amount of insurance per employee is based according to one of the following plans:

1. An unchanging amount of insurance, such as $1,000, for each employee.

2. An amount based upon wage or salary, such as 75 per cent or 100 per cent of salary.

3. A progressive amount depending upon length of service; for example: insurance of $500, at the end of three months service; $750 at the end of one year, $1,000 at the end of two years, and thereafter the amount increasing by $250 a year until a maximum of $1,500 or $2,000 has been attained.

For several reasons, group insurance is the cheapest form of indemnity. The premiums on each individual are collected as one. All records and correspondence go to and from the insurance company through one channel only, the employer, and the elimination of all personal medical examination further reduces the cost. Some railway employers pay 100 per cent of the premium; others only furnish the machinery for collecting the premiums from the employees. The following are instances of group insurance now in force on the several electric railways.

The Third Avenue Railway covers 3,301 individuals under its group contract. Each employee is protected with a flat amount of $1,000. The employees of the company contribute to the cost of the insurance. The Eastern Massachusetts Street Railway covers 413 employees and pays 100 per cent of the cost. The amount of insurance varies with the length of service, with a minimum of $300 and a maximum of $3,000. The Milwaukee Northern Railway Company has two classes, according to the employee's responsibility for dependents and contribution to the cost.

Of the twenty electric railways insured for group insurance in one insurance company, fourteen of the companies pay the entire cost and in thirteen the amount of policy varies.

The principal companies writing group insurance have at the present time approximately 21,000 electric railway employees insured for a total amount of about $21,000,000. Statistics of the insurance outstanding for the past nine years follow:

Year ended	Number of Electric Railway Employees Insured	Amount of Insurance
June 30, 1913	150	$ 150,000
June 30, 1914	3,500	3,500,000
June 30, 1915	5,000	5,000,000
June 30, 1916	9,500	9,500,000
June 30, 1917	9,500	9,500,000
June 30, 1918	14,000	13,500,000
June 30, 1919	20,000	19,000,000
June 30, 1920	22,000	21,000,000
June 30, 1921	21,000	21,000,000

The amounts of all kinds of group life insurance in force, as reported by the various companies to the insurance commissioners on Jan. 1, 1922, were as follows:

Travelers'	$424,443,627
Equitable	376,107,369
Aetna	318,085,180
Metropolitan	289,499,073
Connecticut General	73,206,546
Prudential	45,382,320
Missouri State	14,038,783

The average cost of group life insurance per $1,000 depends, of course, upon the ages of the individuals in the group. The annual rate per thousand would vary somewhere between $10 and $15 per thousand; favorable mortality experience, however, would tend to reduce the cost.

An advantage of group insurance, besides the protection afforded, is the inspection service usually given by the insurance. Often a railway company, because of years of familiarity, is blind to certain dangerous conditions around its properties, such as unguarded transformers, switchboards and high-tension apparatus; linemen working on high-tension lines with inadequate protection, etc. These hazards are much more easily recognized by an outside inspector from the insurance company which obviously has a keen interest in reducing all dangerous conditions to a minimum.

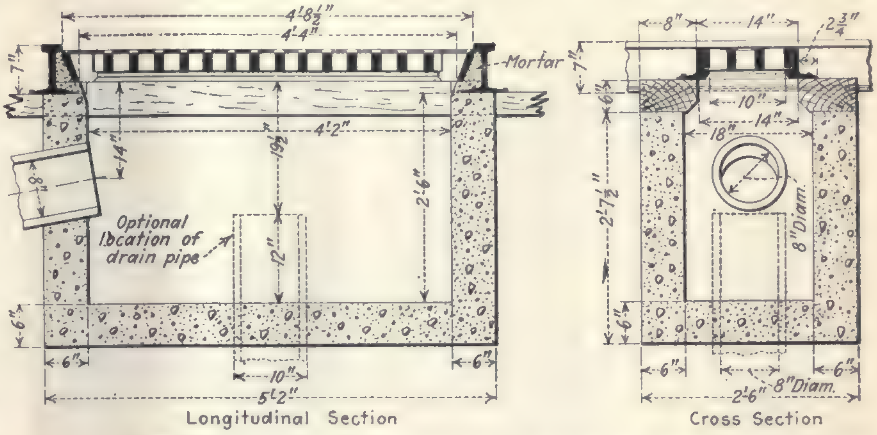
Group insurance has been regarded by many electric railway companies as a measure of undeniable justice and is regarded by them as one of the fair conditions of employment. The physical comfort of employees has for many years been the concern of management. Quite as important as physical comfort is the peace of mind that comes with a sense of security created by protection. More and more is economic security coming to be regarded as a necessity in the life of every individual. This is at least one of the functions of group insurance for employees. The fairness and justice of group insurance is its supreme and unanswerable argument.

New Type of Track Drain

Has Brick or Concrete Catch Basin and Flat Street Surface —It Is Low in Cost and Can Be Cleaned With a Shovel—Other Features

By Leon R. Brown
Office and Field Engineer, New York State Railways, Rochester, N. Y.

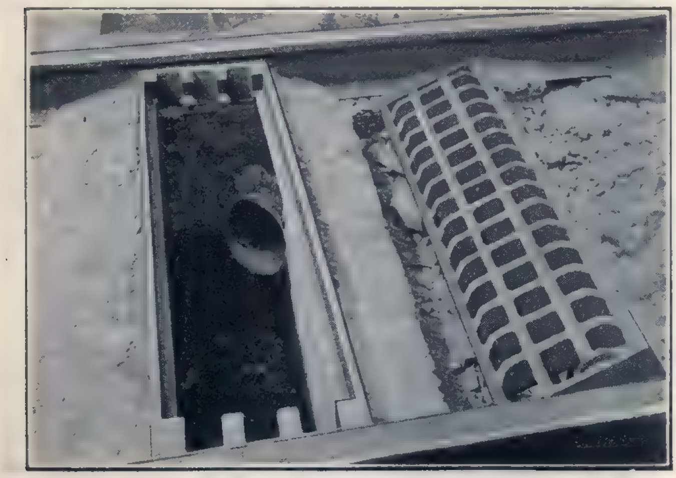
The New York State Railways is trying out a new type of track drain. The principal features are the brick or concrete catch basin with a dirt chamber and the flat street surface with large openings. The drawing shows the details of the construction. The connections to the sewer consist of a 10-in. sewer pipe embedded in the brick or concrete walls of the catch basin. The pipe can come in from any direction or any angle but it is always so arranged that the bottom of the opening will be 1 ft. above the bottom of the chamber.



Vertical Cross and Longitudinal Sections of Drain

To avoid wide spacing of ties, it was necessary to set the framework of the cover on top of the ties where it is held in place by lag screws or track spikes. The ties are dapped at each end to form a table to support the casting and thus make the use of shims on top of the ties unnecessary. The cast frame and cover are stock material made by the Barbour-Stockwell Company for use with low T-rail, and this cover is used where the pavement is laid under the head of the T-rail. Other covers can be secured to fit any type of rail or pavement but the cover should always be flat, and the pavement should be sloped back for several feet on either side to meet the cover. This construction avoids bumps to vehicular traffic and leads all water into the proper drain.

This track drain costs only about one-half what the old standard cost, is easier to handle and install, will take more water from along the rail and is much less likely to become clogged both on the surface and under ground. The old standard drain consisted of a large funnel-shaped casting with no provision for trapping dirt, leaves, sticks, etc. The new catch basin can be cleaned with a shovel instead of having to be flushed. So far the drains have proved highly satisfactory on this property.



Drain with Pipe at Side

Drain with Pipe at End

Safety Epigrams

by

Cecil G. Rice

President American Electric Railway Claims Association

How long would a general manager retain a purchasing agent who considered his position on a basis of how much he bought a year, or a treasurer who rated his importance on a basis of how much he paid out? If a claims director pays out $1,000 the test should be—Could that for which the expenditure was made have been prevented?

If there are no accidents there are no claims. Accidents can be prevented.

Safety is part of the service for which the public pays.

The efficient manager does not need to be sold safety. He knows.

When traction lines paid only when at fault it was different. Now they have to pay often when not at fault. Safety becomes more important.

If a reasonable manager needs to be sold safety, it can be done simply by telling him the facts.

Once we all thought typhoid fever and consumption were part of civilization; now we know they are not. Neither are accidents.

It is not a man's record, but what he knows and the way he *thinks* that determine his fitness for safety work.

Using safety organizations for other than safety and welfare work is unfair and will prove disastrous.

There is a difference between systematic and persisitent accident prevention intelligently conducted and so-called "safety first."

Safety is human engineering. Anything that affects the individual has a bearing on accident prevention.

There is a vast difference between "I told him" and real education. Safety is 85 per cent education.

Intelligent accident prevention is an investment, not a speculation.

Failures in safety work have resulted from trying too much or too little without the guidance of one who knows.

Start right in safety. It is hard to revive after a failure.

Money is less necessary in safety than a heart and a will to do.

Claims men are logical prospects for safety directors.

Accident prevention is welfare, good business, civic obligation and religion all in one.

Safety has become an Engineering Standard.

C. G. RICE

Too direct action in safety imperils results. Doctors want all medicine. Attorneys want all law. Operating men want all discipline. The real aim is to secure future and immediate results beneficial to all departments.

Safety first is not enough—the objective must be safety always and in all ways.

Accident prevention is education and conservation, not expenditure.

The human element is more vital than material failure.

Mechanical devices are chiefly valuable in proving that the management is in earnest in its desire to protect employees and the public.

The objective sought is the prevention of accidents. The means are incidental.

The best means to safety is the development of a correct mental attitude.

Safety must be sold—not forced.

The facts in safety are the best sales arguments.

Every employee is a potential assistant in safety work. His cooperation must be secured.

Safety is a synthetic specialty composed of every interest affecting the company and its employees.

Safety means more to an electric railway than to any other branch of industry. Why should the manager hesitate?

Confidence is essential to success in everything. Safety demands confidence.

Search your heart regarding accident prevention. Then get to work.

Saving money is a mere byproduct of safety.

Consciousness of service, fundamental public sentiment, better morale of employees and improved service are direct benefits of safety.

Safety has passed the experimental stage. It affects all human relations.

What does safety save? Forget it. Is safety a duty of service? *Yes.*

Accident reduction is positive. Accident elimination is possible.

Education tending to a public conscience and sentiment is a valuable foundation which safety leads to.

Efforts which cause the individual to think of his own safety and that of those about him are constructive and fundamental.

Perfection in company safety is not essential before organizing community activity. The interest, understanding and sympathy of the public are more necessary. They are an asset that encourages and leads to greater safety among employees.

An experienced and efficient safety engineer is a rare and invaluable staff assistant who can develop dividends paid in co-operation, morale of employees, public sentiment, service and savings.

The executive is the power station. Safety must radiate from him down the line to the man on the job. The circuit is completed when safe acts return along the same line. Then the contact sparkles with life, love, service, satisfaction and success.

The mystery and overdevelopment of the legal aspect have encouraged claims. The common sense of accident prevention is claims prevention.

Fundamentally safety taught in the schools offers the biggest immediate and ultimate return for: It is the children who need to be protected.

Children in the schools are organized and readily reached.

They respond immediately.

Safety teachings vitalize their routine studies.

They carry the message to the others of their family.

They become the workers and passengers of tomorrow.

They will be the safe parents of the safe children of the future.

New Fare Box Has Many Unique Features

Motor Drive Gives Instantaneous Registration and Provides Conductor With Check on Honesty of Passengers and Helps Him in Performing His Duties Well

OPERATING men have long been waiting for a registering fare box that would accomplish as a unit what the present registering box used in conjunction with an overhead clock register does. The double check on fares collected has been a very efficient means of getting all the money into the treasury of the company. But it has also been a source of undesirable controversy between conductors and superintendents on a few street railways. Hence, among other things, the new box now placed on the market by the Johnson Fare Box Company, Ravenswood, Chicago, after years of developmental work, is said to solve this problem, as it automatically rings up each fare on a register that is mechanically an integral part of the box, but is elevated above it so as to be in plain view from platform and from within the car. In addition to giving a double check automatically, it further helps the conductor by providing him with a visible check on the passenger's deposit, which it is claimed should quite effectively eliminate controversies as to amount paid between conductor and passenger.

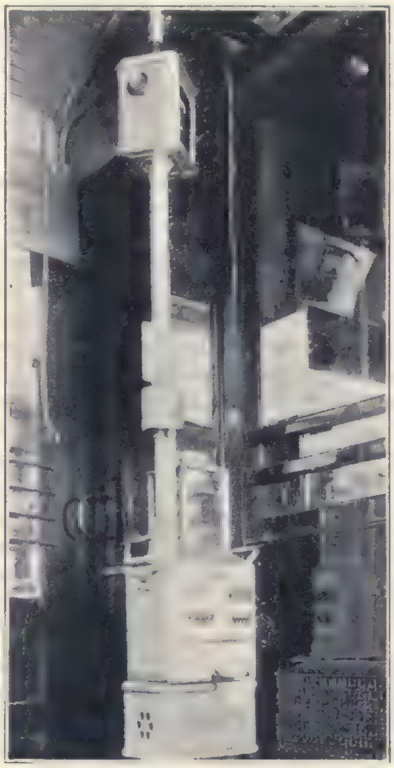
By virtue of a motor drive on the box, which happily relieves the conductor of grinding the fares through by hand, a practically instantaneous registration of each fare is secured. The great advantage of this is that dependence need no longer be placed entirely on the visual aptitude of the conductor in determining whether each passenger has dropped in the proper amount of money—a thing which becomes very difficult with multiple-coin fares at heavy loading points. There are three separate registering features. The usual dials on the side of the fare box proper analyze the receipts as to two classes of tickets and cash. A dial, part way up the rod which supports the upper register and about even with the conductor's eyes, shows the amount of money deposited per passenger. That is, for example, if the rate of fare is 7 cents, this dial quickly progresses from 0 to 7 and then starts again at 0 as the next cash fare is deposited. If a passenger short-changes the company and puts in only 6 cents, say, this middle dial moves around to 6 and the upper register does not ring up another fare. The omission of the bell and the visual indication of the amount paid give the conductor practically immediate warning that the correct amount has not been deposited.

INSPECTION PLATE NOT USED NORMALLY

Because of this plan, the usual plate whereon the coins stop for inspection until the conductor dumps them in is so mounted that in its normal position it permits the coins and tickets to go straight into the box without inspection. The plate is retained in the box so that the conductor, if suspicious of a passenger, can raise it in position to stop the fare for inspection, but normally the plate is not in use. If one passenger short-changes the box and subsequent passengers drop in their correct fares, the upper register records each full fare put in, but the middle register keeps showing up the one shortage, or the accumulated shortage, if more than one passenger puts in less than the required amount.

Fares that are paid with metal tokens are rung up on the upper register, but are not recorded on the middle dial, as there is no possibility of short-changing when the token is used.

The new box contains many other improvements. It can be arranged to handle six kinds of coins—nickels, pennies, dimes, Canadian nickels and two sizes of metal tickets. As the machine gages to both diameter and thickness, a dime flattened out to the size of a penny will still register as a dime. Mutilated coins register correctly usually, but in any event they will go through the machine and not clog it. It is claimed also that the machine can be very simply and quickly changed to meet the new requirements with a change in the rate of fare. The coin plate which counts the coins through the box is so designed that it will handle coins of any denomination at the same speed. Another feature is that the cyclometers are positively locked except as released when properly in gear. The mechanism for driving the overhead register is so arranged that the drive is direct from the motor, the coin simply throwing a trigger which engages a clutch on the overhead drive. By this means, the coin does not carry the load of the drive and danger of trouble is avoided.


NEW FARE BOX ON CHICAGO CAR

The usual fare analyzing dials and the new split fare recorder and upper register are clearly seen, also the motor box on which fare box rests.

Only one fare box is used on a double-end car, but the plan is to install a separate motor on the platform at each end. The motor is inclosed in a Duralumin box measuring 6½x10x6 in. The motor used is of about $\frac{1}{50}$ hp. at 550 volts. Resistance is used in the circuit, so that the voltage across the field is 12, while that across the armature is 270. The motor is a shunt series wound type, which requires about 275 watts—0.5 amp. at 550 volts. Each motor is given a ground test up to 2,250 volts to insure against any breakdown on a current surge.

The motor is connected up to a worm-driven transmission by means of flexible couplings and fiber gears, which produces a practically noiseless driving mechanism. When the fare box and overhead register is carried from one end to the other, taking it off the motor box at one end automatically shuts off the motor, and putting it in place at the opposite end automatically starts the motor. The motor in use runs continuously, although a switch is provided for cutting it off at night. The mechanism is all sealed, and should it clog in some way or the current be cut off, or if the motor should fail to operate for any reason, the fare box may then be hand operated as with the older box. On test, a motor was stalled for thirteen hours without giving any motor trouble.

An arrangement is provided for driving the motor at two speeds. When traffic is light, the motor is operated at the lower speed, as it consumes less current. But in heavier traffic, where quicker registration is desirable, it is planned to operate the motor at the higher speed.

The initial installation of these fare boxes was made on fifteen cars of the Chicago Surface Lines, where they have been tried out under operating conditions for the past ninety days.

Brooklyn Tries Automatic Coin Switch for Registering Fares

The Coin Switch Serves as a Fare Box, and in Addition Has a Mechanism for Automatically Operating the Electric Fare Register Used

THE Brooklyn Rapid Transit Company has used electric cash and transfer registers on its cars for the past eight years. With the usual installation these registers are located at the ends of cars and are operated from push buttons or foot switches by the conductor in any location at which he is stationed. A description of these electrically operated registers was given in the *Electric Railway Journal for* May 9, 1914, page 1047.

With the introduction of one-man operation it appeared desirable to have a fare box which would automatically register the fares without the necessity of having the operator push a foot button or crank a coin box to detract from other duties. Accordingly the automatic coin switch shown in the accompanying illustration was developed and patented by E. J. Kennedy, superintendent of the railway register department. Equipments for general sale are being manufactured by the Perey Machine Works, Brooklyn, N. Y. These combined fare boxes and coin switches are approximately 8 in. x 14 in. x 3 in., and provide for inspection of the fare deposited through glass windows. The case is made of 1/32 in. sheet copper oxidized, and the frame is a brass casting. Glass ⅜ in. thick reinforced with wire mesh is provided in the front and the end next to the operator. The fare is deposited in a slotted receptacle on top of the box. This slot will receive pennies, nickels or dimes. The depositing of a coin in the slot operates a mechanism which establishes electrical contact and thus operates the fare register. This registration of the fare takes place before the coin is released, after which it then drops to the inspection plate where it can be viewed by the car operator and passenger. No cranking is necessary on the part of the operator to release the coin. If a dime is deposited two fares are registered as soon as it enters the receptacle. The depositing of a nickel or penny registers one fare. In case a penny is used, of course, it is necessary for the operator to get the additional amount necessary to pay the passenger's fare. As at present arranged two boxes are used for each double-end one-man car. These are located on brackets attached to the center upright stanchion at the car entrance. The cost of the two boxes is no more than that of a single fare box of the usual type. Should it be necessary to make repairs to the coin switch this can be lifted off its supporting brackets and be replaced with another while repairs are being made. The opening in the fare slot is controlled by means of a key, so that the slot is closed except when the key is in position. The box can be cleared of fares with one hand by pushing down a small chute at the bottom of the box. Dimes and nickels have separate receptacles so that in clearing the box of fares, these can be placed in change carriers without the necessity for sorting, thus saving much time.

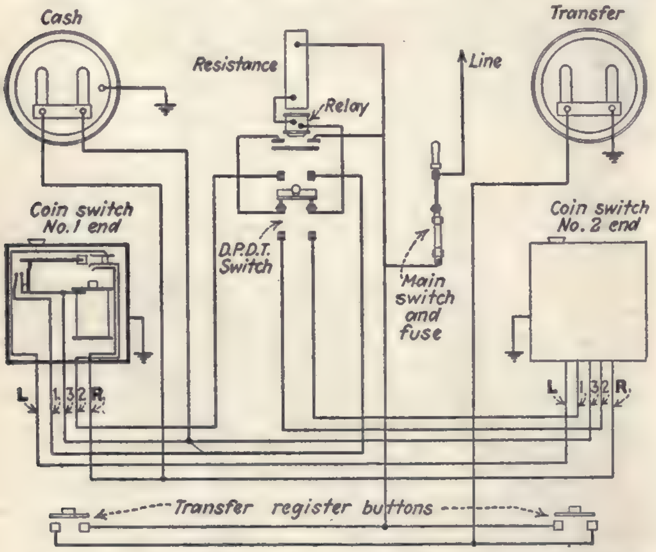


DIAGRAM OF COIN SWITCH INSTALLATION FOR DOUBLE END CAR

COIN SWITCH IN POSITION ON STANCHION

In the accompanying diagram of connections, a double-pole double-throw switch is shown for cutting out the register on the end of the car which is not in use and closing the circuit at the operating end. On some of the Brooklyn cars, this switch has been replaced by interlocks connected to the reverser in the controller, so that the coin box is automatically cut out whenever the reverse drum is centered. The main switch and fuse provides for cutting out the entire mechanism whenever necessary.

An outstanding feature of this coin switch when used in connection with an electrically-operated register is that there is but one totalizer to be checked. An instantaneous registration of each fare is obtained together with a double visible check of the passenger's deposit. All fares are also registered the instant they are deposited so that no time is lost when an inspector boards the cars through the necessity of having to wait until the fare box is cranked so as to register all fares deposited.

This type of coin switch has also been used for the past two years in connection with the automatic operation of turnstiles at several of the elevated stations of the Brooklyn Rapid Transit Company and a further extension of its use in this service is contemplated.

Is Freight Operation on Electric Railways a Paying Proposition?*

An Analysis of Various Methods by Which the Cost of Hauling Passengers and Freight on an Electric Railway Can Be Apportioned —Particulars of Livestock Traffic

By L. T. Hixson
Auditor Indiana & Eastern Traction Company, Anderson, Ind.

THIS question might well be classed with the Darwinian theory as to the origin of a man so far as the possibility of being answered satisfactorily to every one is concerned. However, this may be on account of our overlooking the fact that it has two distinct phases, and an affirmative answer to one angle does not necessarily mean an affirmative answer to the other; in fact it may be negative.

The difference of opinion arises largely on account of the following:

1. Does the question refer to the net income from freight operation, after charging all direct expense and apportioning overhead (see Exhibit F-b) or

2. Is the reference to the net income after deducting direct freight expense only, including depreciation on freight equipment; or as we commonly say, such expense as we would not have if we were not operating the freight business? (See Exhibit F-g).

It would appear that the logical method of estimating for a road about to engage in the freight business would be the latter plan or method as a preliminary step. If this estimate shows that the revenue will provide a small net over and above the additional expenses, including wear and tear on present property, the company would certainly be justified in going into this business, even though it could not pay its entire proportion of overhead as provided in plan (1). This conclusion is based on the well-known method employed in manufacturing or mercantile business. If any special line will make a slight profit over direct expense, it reduces the general overhead by that amount, and thus works out a net profit for the entire business.

However, the most sensible way after the business is in operation would appear to be to charge to freight operations all direct expense and also to apportion the overhead as in plan (1). If the business then shows a net profit, no matter how small, you may be very sure it is a paying proposition. If there is a deficit shown on method (1), it is high time to apportion on plan (2), direct expense. If this method shows a slight margin the freight is still a paying proposition, but if there is a deficit, you are facing a net loss, and the only hope is to increase the gross and decrease the direct operating cost.

When a company operates interurban passenger and freight city lines and electric light and power properties jointly, the problem of allocation of indirect expenses becomes more difficult. To illustrate some of the steps which are necessary the accompanying exhibits have been prepared, using as a basis the actual figures for the month of November, 1921. These apportion all expenses—direct and indirect.

Exhibit A—Car-miles, ton-miles and gross earnings, classified so as to provide a basis for apportioning indirect expenses.

Exhibit B—Apportionment of income and expenses to various departments.

Exhibit C—Condensed income account by departments.

Exhibit D—Railway statistics per car-mile, regardless of size, or kind of car. (Based on income account Exhibit C).

Exhibit E—Loaded weight ton-miles.

A convenient chart for comparing the various methods of allocating operating expenses is provided by:

Exhibit F—Railway statistics, showing gross, operating and net from operation in various forms. The columns in this table are worked out as follows:

(*a*) Operating expense, based on direct, dead weight, ton-mile, and gross earnings (same as Exhibit D and plan (1), as set forth in the second paragraph).

(*b*) Operating expense, based on direct, loaded weight, ton-mile, and gross earnings.

(*c*) Operating expense, based on direct, car-miles and gross earnings.

(*d*) Operating expense, based on car-miles.

(*e*) Operating expense, based on gross earnings.

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*Address presented at meeting of Central Electric Railway Accountants' Association, Michigan City, Ind., Aug. 25.

EXHIBIT A—TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

BASIS FOR APPORTIONING CITY CAR-MILES AND TON-MILES FOR NOVEMBER, 1921

	City					
	City Motor—Two Men			City Motor—One Man		
Division	Car-Miles	Tons	Ton-Miles	Car-Miles	Tons	Ton-Miles
Terre Haute	......	....	....	246,764	x 6	1,480,584
Northwestern	......	....	....	1,950	x 11	21,450
Eastern	33,698	x 15	505,470	....	....	....
Martinsville	......	....	....	....	....	....
Brazil	......	....	....	....	....	....
Danville	......	....	....	....	....	....
Crawfordsville	......	....	....	1,950	x 11	21,450
Total	33,697		505,470	250,664		1,523,484

BASIS FOR APPORTIONING INTERURBAN CAR-MILES AND TON-MILES FOR NOVEMBER, 1921

	Interurban Passenger						Interurban Freight					
	Interurban Pass. Motor			Interurban Pass. Trail			Interurban Frt. Motor			Interurban Frt. Trail		
Division	Car-Miles	Tons	Ton-Miles	Car-Miles	Tons	Ton-Miles	Car-Miles	Tons	Ton-Miles	Car-Miles	Tons	Ton-Miles
Terre Haute	66,740	x 35	2,335,900	.....	....	....	6,416	x 34	218,144	295	x 12	3,540
Northwestern	78,094	x 37	2,889,478	2,068	x 27	55,836	11,872	x 36	427,392	9,866	x 15	147,990
Eastern	72,503	x 37	2,682,611	830	x 27	22,410	11,254	x 36	405,144	17,864	x 15	267,960
Martinsville	27,348	x 37	1,011,876	.....	....	....	1,532	x 36	55,152	159	x 15	2,385
Brazil	69,492	x 37	2,571,204	3,207	x 27	86,589	6,422	x 36	231,192	9,848	x 15	147,720
Danville	15,238	x 37	563,806	39	x 27	1,053	1,053	x 36	37,908	108	x 15	1,620
Crawfordsville	42,026	x 37	1,554,962	2,881	x 27	77,787	7,842	x 36	282,312	11,410	x 15	171,150
Total	371,441		13,609,837	9,025		243,675	46,391		1,657,244	49,550		742,365

		Car-Miles	Ton-Miles	Per Cent	Per Cent
A	Interurban passenger				
	Motor	371,441	13,609,837	......	......
	Trail	9,025	243,675	......	......
	Total	380,466	13,853,512	85.24	75.78
B	Interurban freight				
	Motor	46,391	1,657,244	......	......
	Trail	49,550	742,365	......	......
	Total	95,941	2,399,609	14.76	13.12
C	Total interurban	476,407	16,253,121	100.00	......
D	City lines	284,362	2,028,954	......	11.10
E	Grand total	760,769	18,282,075	......	100.00
			Amount	Per Cent	
F	Gross earnings				
	Interurban passenger	....	$210,941.84	76.35	......
	City	....	65,322.59	23.65	......
	Total	....	$276,264.43	100.00	......

	Interurban passenger	Car-Miles	Ton-Miles	Per Cent	Per Cent
G	Gross earnings				
	Pass. interurban	....	$210,941.84	66.45	......
	Freight	....	41,191.16	12.97	......
	City	....	65,322.59	20.58	......
	Total	....	$317,455.59	100.00	......
H	Gross earnings				
	Pass. interurban	....	$210,941.84	83.66	......
	Freight	....	41,191.16	16.34	......
	Total	....	$252,133.00	100.00	......
I	Gross earnings, pass. int.	....	$210,941.84	51.95	......
	Freight	....	41,191.16	10.15	......
	City	....	65,322.59	16.09	......
	Light and power	....	88,552.91	21.81	......
	Total	....	$406,008.50	100.00	......

EXHIBIT B—TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

RAILWAY DEPARTMENT

INCOME ACCOUNT FOR MONTH OF NOVEMBER, 1921 (CENTS OMITTED)

	Revenue	System	Passenger	Freight	City	Memo Disp. Frt.*
	Revenue from transportation....	$311,156	$205,328	$41,144	$64,684	$10,890
	Other railway revenue.........	6,299	5,613	47	638	477
	Total........................	$317,455	$210,941	$41,191	$65,322	$11,367
	Expenses					
	Way and structures					
	Crossings and fences......	$ 854	....	....	....	....
	Signal and interlocking....	925	....	....	....	....
	Telephone and telegraph...	1,789	....	....	....	....
	Bridges..................	1,517	....	....	....	....
	Stations and platforms....	4,514	....	....	....	....
	Sub total................	9,601	$ 8,183	$ 1,417	....	....
E	Other way and struc. exp...	43,264	32,786	5,676	$ 4,802	....
	Total..................	$ 52,864	$ 40,969	$ 7,093	$ 4,802	$ 3,482
	Equipment					
X	Pass. and comb. cars......	$ 12,159	$ 8,942	....	$ 3,217	....
X	Freight cars.............	557	....	557	....	....
E	Depreciation.............	1,191	902	156	132	....
E	Other expenses...........	11,479	8,699	1,506	1,274	....
	Total..................	$ 25,386	$ 18,543	$ 2,219	$ 4,623	$15,76
	Power					
	T. H. transm. and transf...	$ 628	....	....	....	....
	Substation buildings.......	....	....	....	....	....
	Substation equipment.....	61	....	....	....	....
	Trans. system............	56	....	....	....	....
	Substation employees......	2,958	....	....	....	....
	Substation expenses	6	....	....	....	....
C	Subtotal.................	3,708	$ 3,160	547	....	....
E	Other power expenses.....	39,438	29,818	5,162	4,367	....
	Total..................	$ 34,055	$ 32,978	$ 5,709	$ 4,367	$ 2,803
	Conducting Transportation					
X	Passenger conductors, etc..	$ 37,935	$ 20,654	....	$17,281.	$ 1,755
X	Freight..................	4,818	....	$ 4,818	....	....
C	Operators signal..........	769	656	114	....	55
C	Oper. tel. and telegraph...	180.72	153	26	....	13
X	Loss and damage..........	434	....	431	....	....
X	Station employees and exp.	7,133	1,487	4,457	195	1,405
C	Station employees and exp.	6,383	5,440	942	....	462
G	Other expenses...........	15,369	10,213	1,993	3,163	868
	Total..................	$ 73,018	$ 39,603	$12,775	$20,639	$ 4,560
H	Traffic..................	$ 1,187	$ 993	$ 193	....	$ 84
	General and miscellaneous					
X	Rent of tracks............	$ 9,779	$ 7,979	$ 1,685	$ 114	$ 191
X	Rent of equipment........	314	....	314	....	....
G	Other general expenses....	23,009	15,289	2,984	4,735	1,299
	Total..................	$ 33,102	$ 23,268	$ 4,983	$ 4,849	$ 1,490
	Total operating expenses....	$228,613	$156,356	$32,975	$39,281	$13,997

BASIS OF APPORTIONING OPERATION EXPENSES

Key	
A	Interurban passenger ton-miles
B	Interurban freight ton-miles
C	Total interurban ton-miles
D	City lines ton-miles
E	Total ton-miles—city and interurban
F	City and interurban passenger ton-miles
G	Total gross earnings
H	Interurban gross earnings
X	Direct or actual.

*Dispatch freight represents freight carried on passenger cars and included in interurban passenger revenue and expenses. However, in the "Memo" column the amount of expense when not an actual apportionment is based on approximate space required in the car.

The baggage compartment is 17 per cent and the dispatch freight is taken as one-half or 8½ per cent of the total car.

EXHIBIT C—TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

INCOME ACCOUNT, NOVEMBER, 1921

		System	Interurban Passenger	Interurban Freight	City	Light and Power	Memo Disp. Frt.
X	Gross earnings....	$406,008	$210,941	$41,191	$65,322	$88,552	$11,367
R	Operating expenses	275,673	156,356	32,975	39,281	47,059	13,997
	Net from operation......	$130,335	$54,585	$8,216	$26,040	$41,493	$2,629
	Other income.....	28,400	14,754	2,882	4,569	6,194	1,254
	Total income.....	$158,736	$69,339	$11,098	$30,610	$47,687	$1,375
X-G	Taxes............	35,100	21,461	4,188	6,646	2,803	1,824
	Fixed charges and rentals.........	92,098	47,845	9,347	14,818	20,086	4,066
	Surplus..........	$31,538	$33.77		$9,144	$24,798	
	Deficit..........			$2,438			$7,266
	Sinking fund.....	17,444	9,062	1,770	2,806	3,804	770
	Surplus..........	$14,092	....	....	$6,338	$20,993	
	Deficit..........	....	$9,029	$4,208	......	......	$8,037

Key—X, direct. R, see railway income sheet for particulars. I, on basis of railway and light earnings. X-G, light and power taxes direct, railway based on interurban and city gross earnings. Interurban passenger includes dispatch freight.

EXHIBIT D—TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

RAILWAY DEPARTMENT STATISTICS, MONTH OF NOVEMBER, 1921

	Railway System	Int. Pass	Int. Freight	Total Int.	City Lines
Gross per car-mile transporatation.	0.4090	0.5397	0.4289	0.5173	0.2275
Other.........................	.0083	.0147	.0004	.0119	.0022
Total gross.................	.4173	.5544	.4293	.5292	.2297
Op. expenses per car-mile..........	.3005	.4109	.3437	.3974	.1381
Net revenue per car-mile..........	.1168	.1435	.0856	.1318	.0916
Other income..................	.0291	.0387	.0300	.0370	.0160
Total income..................	.1459	.1822	.1156	.1688	.1076
Taxes per car-mile...............	.0424	.0564	.0436	.0538	.0234
Fixed charges and rentals.........	.0947	.1257	.0974	.1200	.0521
Sinking fund..................	.0178	.0238	.0185	.0227	.0098
Surplus per car-mile.............	......	......	......	......	.0223
Deficit per car-mile..............	.0090	.0237	.0439	.0277	

Note:—The expenses apportioned to the various classes of business were based principally on the ton-miles (when not direct). However, the amount of such expenses determined as above stated are here shown on a car-mile basis regardless of the size or kind of car, whether interurban motor or trailer or city car; i.e., the total expenses were divided by the total car-miles.

EXHIBIT E—TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

LOADED TON-MILE, MONTH OF NOVEMBER, 1921

	Int. Pass.	Freight	City	Total
Dead weight...............	13,853,512	2,399,609	2,028,954	18,282,075
Load (as below)...........	437,145	491,407	177,726	1,106,278
Loaded ton-mile...........	14,290,657	2,891,016	2,206,680	19,388,353

INTERURBAN PASSENGER LOAD TON-MILE

Interurban passenger revenue*.....................	$193,839.20	
Divided by 3 cents = approximate passenger-mile.......	6,461,307	
Based on 125 lb. per passenger, each passenger weighs 6¼ per cent of a ton.		
6¼ per cent of 6,461,307 = ton-miles..................		403,831
Dispatch freight ton-miles taken from way bills.........		16,657
Baggage arbitrarily same as dispatch freight...........		16,657
Total passenger carload in ton-miles..............		437,145

CITY CAR LOAD TON-MILE

Car-miles.......................................	284,362	
Estimated ten passengers on car at all times = passenger miles................................	2,843,620	
Average weight per passenger—125 lb. or	6¼% of a ton	
6¼ per cent of 2,843,620 = Load ton-miles..............		177,726

FREIGHT LOAD TON-MILE

Calculated from way bills and abstracts (see Exhibit G)	491,407

*Does not include revenue from transportation of dispatch freight, baggage, etc., on passenger cars.

EXHIBIT F—TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

PER CAR-MILE REVENUE AND EXPENSES, NOVEMBER, 1921

Operating expenses apportioning in various ways as set forth in "Key."

	(a) Direct and Dead Weight Ton-Mile	(b) Direct and Total Weight Ton-Mile	(c) Direct and Car Mile	(d) Car-Mile	(e) Gross Earnings	(f) Deead Weight Ton-Mile	(g) As (a) with Certain Items Eliminated
Interurban Passenger							
Gross earnings....	$0.5544	$0.5544	$0.5544	$0.5544	$0.5544	$0.5544	$0.5544
Operating expenses	0.4109	0.4046	0.3435	0.3005	0.3993	0.4553	0.4317
Net from operation	0.1435	0.1498	0.2109	0.2539	0.1551	0.0991	0.1224
Freight							
Gross earnings....	0.4293	0.4293	0.4293	0.4293	0.4293	0.4293	0.4293
Operating expenses	0.3437	0.3659	0.3502	0.3005	0.3091	0.3126	0.2472
Net from operation	0.0856	0.0634	0.0791	0.1288	0.1202	0.1167	0.1821
City Lines							
Gross earnings....	0.2297	0.2297	0.2297	0.2297	0.2297	0.2297	0.2297
Operating expenses	0.1381	0.1390	0.2261	0.3005	0.1654	0.0892	0.1429
Net from operation	0.0916	0.0907	0.0036	0.0708	0. 643	0.1405	0.0868

Key

(a) Operating based on direct expense when possible. Partially on dead weight ton-miles and gross earnings.

(b) Operating based on direct expense when possible. Partially on total weight ton-miles including load and gross earnings.

(c) Operating based on direct expense when possible. Partially on car-miles and gross earnings.

(d) Operating based on car-miles.

(e) Operating based on gross earnings.

(f) Operating based on dead weight ton-mile.

(g) Operating based on direct expense when possible. Partially on dead weight ton-miles and gross earnings. Eliminating from freight expense various items which would remain even if freight operations should be discontinued.

EXHIBIT I—TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

CARLOAD FREIGHT BY COMMODITIES, YEAR, 1921

Commodities	Car Loads	Pounds	Revenue
Livestock............................	3,695	62,678,726	$87,009.64
Switching steam road cars to Indiana Boys' School............................	126	11,222,150	1,799.89
Cement..............................	187	9,299,525	7,415.79
Contractors' equipment................	245	23,952,286	3,957.67
Road material........................	135	13,310,240	1,415.59
Polo ponies..........................	22	484,000	2,686.20
Household goods......................	4	48,000	176.78
Iron pipe............................	1	36,000	22.36
Washing machines.....................	1	16,000	16.51
Lumber...............................	1	36,000	37.80
Empty bottles........................	1	18,575	37.83
Gravel...............................	4893	106,005,350	16,695.04
Total..............................	9,311	227,106,846	$121,271.10

Note:—No l. c. l. freight included.

EXHIBIT G—TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY
FREIGHT STATISTICS. MONTH OF NOVEMBER, 1921.

Commodity	No. Cars	Car-Miles—Loaded			Car-Miles—Empty			Total Car-Miles Loaded and Empty	Tons	Ton-Miles	Revenue			
												Per Car-Mile		
		Motor	Trail	Total Loaded	Motor	Trail	Total Empty				Amount	Loaded	Loaded and Empty	Per Ton-Mile
Car Load														
2—Cement	2	....	153.86	153.86	....	133.66	133.66	287.52	54.7	3,960	$50.62	$0.3290	$0.1760	$0.0128
3—Livestock	334	5,897.28	8,776.00	14,673.28	5,276.40	9,010.55	14,286.95	28,960.23	2,839.7	124,722	7,838.34	.5338	.2707	.0628
4—Gravel	172	1,449.90	4,867.10	6,317.00	1,297.00	4,593.70	5,890.70	12,207.70	3,087.0	92,610	796.85	.1261	.0652	.0086
5—Contractor's equipment	8	114.10	142.42	256.52	69.88	130.98	200.86	457.38	177.7	1,482	193.20	.7531	.4224	.0138
6—Road material	...	....	....	....	....	....	....	....	....	....	....	....	....	....
7—Boys' School	9	....	55.20	55.20	....	43.34	43.34	98.54	385.7	1,544	133.11	2.4114	1.3503	.0862
11—H. H. goods	11	....	133.11	133.11	....	71.88	71.88	204.99	6.0	846	60.84	.4570	.2967	.0719
13—Cinders sold	2	23.22	32.53	55.75	30.55	34.23	64.78	120.53	100.0	3,253	25.00	.4484	.2073	.0077
Total carload	528	7,484.50	14,160.22	21,644.72	6,673.83	14,018.34	20,692.17	42,336.89	6,650.8	228,417	$9,097.96	$0.4203	$0.2148	$0.0398
L. C. L. Classed as merchandise		32,042.05	21,075.92	53,117.97	4.00	482.14	486.14	53,604.11	5,352.1	262,990	32,046.20	.6033	.5978	.1218
Total		39,526.55	35,326.14	74,762.69	6,677.83	14,500.48	21,178.31	95,941.00	12,002.9	491,407	$41,144.16	$0.5503	$0.4288	$0.0837

(*f*) Operating expense, based on dead weight, ton-mile.

(*g*) Operating expense, based on direct, and on dead weight ton-mile and gross earnings after eliminating certain expense items which would not be canceled even if freight should be discontinued (same as plan 2), as set forth in the second paragraph.

This chart will show the fallacy of the car-mile basis for a mixed property. There is very little difference in the net for interurban passenger and city passenger, whether you use the direct and dead weight ton-mile, or direct and live weight ton-mile. However, there is a decided difference in the freight net between the two methods.

The commodity car load and l.c.l. statement, Exhibit G, will show some surprising figures. Eliminating commodity No. 7—Boys' School, which is really a switching movement of steam road cars to the Indiana Boys' School, the highest revenue we have is l.c.l merchandise, which you will notice is 39.78 cents per car-mile, loaded and empty, compared with the next highest, Contractor's Equipment, 42.24 cents per car-mile. Some of the latter is also a switching charge, so that for ordinary freight haul the revenue is less.

Thus, it will be seen that the l.c.l. business is the best paying branch of the freight and at present the backbone of the business, nothwithstanding the fact that it costs us more to handle at terminals. The greater portion of future growth, however, will probably have to come from car-load shipments.

The transportation of livestock is something new for interurban railroads and a great deal of this increased carload freight we are talking about will come from that source. From the nature of the business, however, the greater portion is one way, leaving too much light mileage. Some transportation and traffic genius may work out a schedule which will use the regular l.c.l. freight motor cars for the motive power of the stock cars, and at last save the dead mileage on the motor.

While live stock is loaded and unloaded very promptly, the minimum carload weight of 17,000 lb. is rarely exceeded. Therefore, there will be more net revenue in transporting a commodity of equal rate which will weigh 34,000 lb. to the car even if this latter commodity is not unloaded so promptly and ties up the equipment so that only half the number of carloads may be hauled, for the reason that half the mileage is saved.

There is a considerable amount of other carload freight, however, which is also one-way traffic, one example being cement shipments from Speeds, near Louisville, to points on the lines of the T. H., I. & E. Traction Company, between Indianapolis and Richmond, for national road improvements, and to Terre Haute, and more attention might be given to efforts toward procuring freight for the return trip to the terminals. This is where the special commodity rate good in one direction only will pay. If the return trip pays half rate only it will certainly be an improvement over no revenue whatever.

Referring again to the livestock business, I would like to call attention to a method of competing with trucks in transportating l.c.l. shipments by different owners at carload rates. The livestock superintendent of the Terre Haute, Indianapolis & Eastern Traction Company has worked out a plan whereby arrangements have been made with an organization to accept small lots of livestock from various owners and ship them at carload rates, adding a small charge to compensate for this service. This plan is set forth more clearly in Exhibit H. This exhibit printed is a postcard 5¼ in. x 9 in. and on the front is a space in which specific information, such as the carload rate per 100 lb. from the addressee's shipping point, may be shown.

In connection with the preparation of monthly reports and statistics, I wish to say just a few words relative to the amount of work involved. All of the exhibits shown require a great deal of labor, but Exhibit G is very difficult to prepare unless the Hollerith tabulating machine is used, and for the usual run of freight on interurban lines, the expense would be prohibitive. Therefore, a test statement once or twice each year with a monthly statement of revenue, should keep you on the right track.

As a matter of general information, although it does not give any figures as to whether the freight traffic pays, Exhibit I, setting forth carload freight for 1921, by commodities, is appended.

In conclusion I will say that the freight operation on electric railways as shown by the accompanying exhibits is decidedly a paying proposition and should be increased in every way possible. However, I wish to again state that from time to time a test check should be made.

DO YOU GET TOP PRICE FOR YOUR LIVE STOCK?

You should investigate the Service you can get by shipping to the
INDIANAPOLIS MARKET

VIA

TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION CO.

The Interurban Furnishes a Live Stock Transportation Service that cannot be Duplicated.

1. *Special train service delivery of stock to Indianapolis Yards in from three to four hours*
2. *Light shrinkage.*
3. *Top prices for all kinds of stock.*
4. *Carload service on less-than-carload shipments by various owners.*

HOW YOU GET THIS SPECIAL CARLOAD SERVICE ON SMALL LOTS

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THORNTOWN, INDIANA

EXHIBIT H—POST CARD SENT TO LIVESTOCK SHIPPERS

Freight Operation on Electric Railways*

Is It a Paying Proposition?

By R. S. Drew
Engineer Indiana Service Corporation, Fort Wayne, Ind.

MANY electric railway companies operate railway, light and power departments. Before an accurate judgment can be formed as to the net earnings of each their expenses must be segregated. Some can be allocated directly; others must be apportioned upon arbitrary bases. The cost of power is the most important major account which must be treated in this way.

The Indiana Service Corporation has made a very careful study of these problems, and the writer feels that the allocation of expenses based upon these studies is as accurate as can be obtained. The results of operation of its interurban passenger and freight departments for the twelve months ended May 31, 1922, are given in Table I. The bases used in the segregation of the various accounts involved are set down in Table II. The bases disclosed in this table are different from those used by Mr. Hixson. A discussion of some of these differences follows:

The writer believes that the weight of cars is an important factor in the amount of maintenance made necessary by the operation of them. But if the ton-mile basis is to be used it seems much more logical to use the loaded ton-mile rather than the deadweight ton-mile which Mr. Hixson used in his detailed apportionment.

It must be remembered that much of the cost of maintenance of track and roadway is occasioned by the slow ravages of the weather, with occasionally a heavy storm to increase this expense. It seems to the writer that in the general run of business of the two departments, passenger and freight, the car-mile basis quite accurately represents the relative use of the track and roadway, and the train-mile the use of the distribution system.

EQUIPMENT

The car-hour basis is suggested for the apportionment of equipment expenses which cannot be directly allocated. In most cases about 60 per cent of this account can be directly allocated, the balance being made up chiefly of depreciation and shop expenses. Among the several possible methods of apportioning this latter group are the use of:

The relative cost of rolling stock of each department,

The directly allocated expenses as a basis,

Car-hours, car-miles, or ton-miles.

Actual percentages for these bases, using the expenses of the Indiana Service Corporation for the year 1921, are as follows:

	Cost of Equipment, Per Cent	Direct Expense Basis Per Cent	Car-Hours, Per Cent	Car-Miles Per Cent	Ton-Miles, Per Cent
Passenger department	74	69	67	79	85
Freight department	26	31	33	21	15

It is to be noted how close the agreement is between the direct expense basis and the car-hour basis.

POWER

Obviously the logical basis for the apportionment of power expenses is that of kilowatt-hour consumption. Companies which do not use meters on cars must use approximate relative consumptions. A study of the meter records of this company for one year indicated:

	Kw.-hr. per Car-Mile
Passenger department consumption	2.60
Freight department consumption	2.31

This is a grand average using the sum of motor and trail car-miles, but is

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*Abstract of discussion on paper of L. T. Hixson at meeting of Central Electric Railway Accountants' Association, Michigan City, Aug. 25-26.

TABLE I—INTERURBAN RAILWAY BUSINESS, INDIANA SERVICE CORPORATION, YEAR ENDED MAY 31, 1922

Accounts	Passenger Depart. Total	Passenger Depart. Cents per Car-Mile	Freight Depart. Total	Freight Depart. Per Car-Mile
Way and structures	$147,068	13.01	$37,495	11.62
Equipment	47,998	4.25	13,370	4.14
Power	125,497	11.11	31,853	9.87
Conducting transportation	143,174	12.67	78,006	24.17
Traffic	6,145	.54	1,747	.54
General and miscellaneous	87,192	7.71	22,262	6.90
Taxes	45,057	3.99	12,853	3.99
Total	602,131	53.28	$197,586	61.23
Miscellaneous revenue—credit	21,047	1.86	24,794	7.68
Total expenses	581,084	51.42	$172,792	53.55
Gross earnings	652,020	57.70	157,519	48.81
Net earnings	70,936	6.28	*$15,273	*4.74

SUMMARY

	Total	Per Car-Mile
Total expenses	$753,876	51.89
Gross earnings	809,539	55.73
Net earnings	$55,663	3.84

STATISTICS

Car-miles operated passenger	1,129,991
Car-miles operated freight	322,711

Freight Train	Kilowatt-Hours	Miles	Kilowatt-Hour Per Mile	Additional Kilowatt-Hour for Trailers	Additional Kilowatt-Hour Per Trailer	Total Energy Taken (Kilowatt-Hour-Miles)
Motor car only	1,027	502.4	2.045	.....	....	.....
Motor car and one trailer	2,394	910.4	2.632	.587	.587	534
two trailers	2,883	869.3	3.318	1.273	.636	553
three trailers	1,663	411.1	4.048	2.003	.668	274
four trailers	293	57.0	5.140	3.095	.774	44
five trailers	51	8.4	6.070	4.025	.805	7
Total		2,758.6				1,412
		502.4				
		2,256.2				

1,412 ÷ 2,256.2 = .626 kw.-hr. addtional energy per trailer (weighted).
.626 ÷ 2.045 = 30.6 per cent—ratio of additional power reouired for each trailer to that consumed by the motor car operated alone.

*Deficit.

TABLE II—APPORTIONMENT BASIS DETAILS FOR ITEMS IN TABLE I.

SUMMARY

Expenses

Way and structures:	
Track and roadway accounts	Car-miles
Distribution system accounts	Train-miles
Passenger and freight stations	Direct
Other buildings, fixtures and grounds	Car-miles
Equipment:	
Passenger and freight cars and equipment	Direct
Other equipment accounts	Car-hours
Power	Kilowatt-hours
Conducting transportation:	
Conductors, motormen, trainmen, station employees and expenses	Direct
Other accounts	Car-miles
Traffic	Car-miles
General and miscellaneous:	
Rent of tracks, facilities, equipment	Car-miles
Other accounts	Gross operating revenue
Taxes	Car-miles
Earnings	
Non-operating revenue, credit	Direct and car-miles
Gross operating revenue	Direct

TABLE III—INTERURBAN FREIGHT BUSINESS, INDIANA SERVICE CORPORATION, YEAR ENDED MAY 31, 1922, USING DIRECT FREIGHT EXPENSES

Way and structures		
Estimated maintenance made necessary by freight business at 11 cents per car-mile		$35,498
Maintenance of freight stations		1,410
Equipment		
Maintenance of freight cars		4,280
Maintenance of electrical equipment		1,645
Power at 2.31 kw.-hr. per car-mile		31,853
Conducting transportation		
Freight trainmen		23,217
Station employees		39,952
Station expenses		1,769
Depreciation 4 per cent on $200,000		8,000
Taxes, estimated		2,000
Total		$149,624
Less miscellaneous revenue credit		24,794
Total expenses		$124,830
Gross earnings, freight department	$157,519	
Total expenses as above	124,830	
Net earnings	$32,689	

TABLE IV—T. H., I. & E. REPORT FOR NOVEMBER, 1921, APPORTIONED ON TWO BASES

	Mr. Hixson's Apportionment				Apportionment on Proposed Basis			
	Basis	Passenger	Freight	Total	Basis	Passenger	Freight	Total
Way and structures	B	$40,969	$7,093	$48,062	D	$38,412	$9,650	$48,062
Equipment	A, B	18,544	2,219	20,763	A, F	16,726	4,037	20,763
Power	B	32,978	5,710	38,688	G	31,658	7,030	38,688
Conducting transportation	A, B, C	39,603	12,776	52,379	A, D	37,405	14,974	52,379
Traffic	C	993	194	1,187	D	949	238	1,187
General and miscellaneous	A, C	23,269	4,983	28,252	A, C	23,269	4,983	28,252
Total		156,356	32,975	189,331		148,419	40,912	189,331
Other income, credit		14,754	2,882	17,636		14,754	2,882	17,636
Total expenses		141,602	30,093	171,695		133,665	38,030	171,695
Gross earnings		210,942	41,191	252,133		210,942	41,191	252,133
Net earnings		69,340	11,098	80,438		77,277	3,161	80,438
Taxes	C	21,461	4,189	25,650	C	21,461	4,189	25,650
Net earnings after taxes		47,879	6,909	54,788		55,816	1,028*	54,788
IN CENTS PER CAR-MILE								
Way and structures		10.75	7.39	10.05		10.05	10.05	10.05
Equipment		4.88	2.31	4.35		4.39	4.20	4.35
Power		8.67	5.95	8.12		8.32	7.33	8.12
Conducting transportation		10.41	13.33	10.99		9.84	15.60	10.99
Traffic		.26	.20	.25		.25	.25	.25
General and miscellaneous		6.12	5.19	5.93		6.12	5.19	5.93
Total		41.09	34.37	39.69		38.97	42.62	39.69
Other income, credit		3.88	3.00	3.71		3.88	3.00	3.71
Total expenses		38.21	31.37	35.98		35.09	39.62	35.98
Gross earnings		55.44	42.93	52.92		55.44	42.93	52.92
Net earnings		17.23	9.56	16.94		20.35	3.31	16.94
Taxes		5.64	4.36	5.38		5.64	4.36	5.38
Net earnings after taxes		11.59	5.20	11.56		14.71	1.05*	11.56

Bases of Apportionment: A. Direct or actual where possible. B. Ton-miles. C. Gross earnings. D. Car-miles. E. Train-miles. F. Car-hours. G. Kilowatt-hour consumption. * Deficit.

TABLE V—POWER CONSUMPTION OF TRAIL CARS IN MAY, 1922

Passenger Train	Kw.-Hr.	Miles	Kw.-Hr. Per Mile	Additional Energy Required For Trailer
Motor car only	14,186	5,283	2.68	....
Motor car and one trailer	1,920	463	4.14	1.46 Kw.-Hr.

1.46 divided by 2.68 = 54.5 per cent

to be used for comparative purposes only, as the meters do not register power consumed by the air compressor, lights or heating system. These figures are best used by weighting the car-miles operated by each department and using the resulting figures as a basis for the power apportionment.

Analysis of these records for a shorter period showed that each passenger trailer adds about 50 per cent to the power consumed by the motor car alone, and each freight trailer adds 30 per cent to the power consumed by the motor car alone. The calculations involved are to be found in Table V.

The writer believes that, in general, the car-mile is the best basis for those expenses of conducting transportation which cannot be directly allocated, also for traffic expenses. The gross earnings basis seems to be logical for the general and miscellaneous account, except that the car-mile basis should be used for rent of tracks, equipment and facilities.

In Table IV will be found an analysis of Mr. Hixson's figures using the several bases suggested in Table II. The freight department shows a net deficit for the month, after taxes, of $1,028.

The showing of the freight department of the Indiana Service Corporation for the same month, November, 1921, using the bases suggested in Table II, indicates a deficit after taxes of $2,588, which was the lowest point to which the earnings fell during the twelve months shown in Table I. Since that time the net earnings have steadily improved and May, 1922, shows a net profit after taxes of $397.

The results of operation for the

TABLE VI—ESTIMATED COST OF FREIGHT SERVICE, MOTOR CARS AND TRAILERS, BASED ON TABLE III, FOR TWELVE MONTHS ENDED MAY 31, 1922

A 100-mile run and average speed of 11 miles per hour are assumed.

Expenses for 100-mile trip	Motor Car Only	Motor Car and One Trailer	Motor Car and Two Trailers
Car-miles, 100-mile trip	100	200	300
Way and structures, at 11.6 cents per C.M.	$11.60	$23.20	$34.80
Equipment, maintenance of motor car	1.33	1.33	1.33
Maintenance of elec. equip	1.02	1.02	1.02
Maintenance of trailers	....	1.33	2.66
Depreciation—based on 1 cent per car-mile for motor car and 0.5 cents for each trailer	1.00	1.50	2.00
Power, average for year for freight was 9.87 cents per car-mile. Service consists of average train motor car and one trailer. Trailers consume 0.3 power of motor car alone, each. This gives 15 cents for motor car and 4.5 cents for each trail car per car-mile	15.00	19.50	24.00
Conducting Transportation			
Motor car requires two men; the addition of one or more trailers adds one man to the train crew. Time required for trip is 9.1 hours. Rate of pay: 48 cents per hour	8.74	13.11	13.11
Total	$38.69	$60.99	$78.92
Total per car-mile	.39	.30	.26
All other expenses, including station and general expenses and taxes, and deducting miscellaneous revenue credit	.24	.24	.24
Grand total, per car-mile	$.63	$.54	$.50

TABLE VII—REVENUE PER TON-MILE FOR MAY, 1922, INTERURBAN FREIGHT BUSINESS INDIANA SERVICE CORPORATION

Class	Tons Hauled	Ton-Miles	Revenue	Average Haul	Revenue per Ton-Mile
Local freight	1,185.86	48,107.93	$6,496.32	40.6 mi.	13.5 cents
Interline received	962.99	30,943.16	3,252.95	32.1	10.5
Interline forwarded	778.38	34,915.43	2,684.32	44.9	7.7
Interline overhead	608.78	23,606.77	1,444.81	38.8	6.1
Total	3,536.01	137,573.29	$13,878.40	38.9	10.1

REVENUE PER TON

		Tons Hauled	Revenue	Revenue per Ton
Local freight	L.C.L.	973	$6,251.82	$6.42
	C.L.	213	245.00	1.15
	Total	1,186	6,496.82	5.47
Interline received	L.C.L.	978	3,333.23	3.41
	C.L.	.....	....	......
	Total	978	3,333.23	3.41
Interline forwarded	L.C.L.	730	2,592.79	3.55
	C.L.	34	96.62	2.84
	Total	764	2,689.41	3.52
Interline overhead	L.C.L.	566	1,436.84	2.54
	C.L.	.....	....	......
	Total	566	1,463.84	2.54
Total all classes	L.C.L.	3,247	$13,614.68	$4.19
	C.L.	247	341.62	1.38
	Total	3,494	$13,956.30	$3.99

Note: The differences to be noted between some of the corresponding totals of the two summaries above are due to deferred billing of interline business.

twelve months ended May 31, 1922, using only direct freight expenses, including depreciation and taxes, appear in Table III. The result of this analysis indicates an excellent margin of earnings over expenses, the net being $32,689, or 20.7 per cent of gross earnings.

In Table VI is to be found an estimate of the cost of service, using a motor car and one or two trailers, as compared to the cost of operating the motor car alone.

Summaries have been prepared which show the revenue per ton-mile and the revenue per ton for each of the several classes of freight. This exhibit appears in Table VII.

Paving in Streets with Track

A SPECIAL conference to discuss the design and construction of streets for street railway traffic has been called for Oct. 9 in Philadelphia. It will be held at the Engineers' Club in that city, with the co-operation of members of the American Society of Civil Engineers, American Electric Railway Engineering Association, American Society for Municipal Improvements, Society of Municipal Engineers, Federal Highway Council, and the Motor Truck Association of America. Invitations are being sent to engineers of cities and of railway companies. There will be morning, afternoon and evening sessions, with a subscription dinner at 6 p.m.

The general subject has been divided as follows: (a) Location of utilities in the street; (b) Design of the street railway structure; (c) Paving and drainage of streets for street railway traffic; (d) What should be the responsibilities of the street railway company as to cost of installation and maintenance of paving? (e) To what extent is paving affected by street railway tracks?

The members of the committee in charge of the meeting are: C. M. Pinckney, chief engineer, New York City; Col. R. Keith Compton, consulting engineer, Paving Commission, Baltimore, Md.; Major F. S. Besson, assistant to the engineer commissioner, Washington, D. C.; R. C. Cram, engineer of surface roadway, Brooklyn Rapid Transit Company; E. J. McIlraith, superintendent of rolling stock and buildings, Philadelphia Rapid Transit Company; Julius Adler, deputy chief, Bureau of Highways, Philadelphia; John Meigs, consulting engineer, Philadelphia, and Charles E. Billin, secretary, Engineers' Club of Philadelphia.

Accountants Discuss Freight Costs

AN ACTIVE discussion followed the presentation of a paper on the cost of handling freight, read at a meeting of the Central Electric Railway Accountants' Association, held in Michigan City, Ind., on Aug. 25-26. The paper was presented by L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company, and was entitled "Is Freight Operation on Electric Railways a Paying Proposition?" A written discussion on this topic was presented by R. S. Drew, engineer Indiana Service Corporation. Both of these papers are published in abstract in this issue.

In the oral discussion of these papers emphasis was laid by several speakers on the need of meters on cars if there is to be a proper determining of freight costs. It was also agreed that there were other expenses, which could not definitely be segregated as applying to freight operation, which should be charged to it. Another point made was that the railways could handle freight in trail cars at a lower cost than in motor cars, and that it was cheaper to handle trail cars behind freight motor cars than behind passenger motor cars.

A special vote of thanks was voted to both Mr. Hixson and Mr. Drew for the valuable information they had presented, and the president was authorized to appoint a special committee on freight costs. The next regular meeting of the association will be held in Lima, Ohio, Jan. 26-27, 1923. A vote of thanks was also extended to Mr. Pantel for the care which he had taken of the members at the Michigan City meeting.

On the morning of Aug. 25 the executive committee held a meeting and passed on a number of subjects. The unit interline waybill was discussed and the size of 8½ in. x 5½ in. was adopted for one size and 8½ in. x 11 in. for the other. The use of this waybill is not mandatory but companies who can consistently use it are urged to do so as well as to use passing stamps of uniform design and size, to conform to the size that will be accommodated by the printing space for junction stamps on the waybill. A post card form for junction reports was also adopted.

Eleventh Annual Safety Congress

Addresses by Prominent Electric Railway Men Were a Feature—Concern Was Expressed Over Tendency Toward Increase in Accidents, but Safety Council Is Credited with Great Influence in Spreading Gospel of Accident Mitigation

UNDER the auspices of the National Safety Council, the eleventh annual safety congress was held at the Cass Technical High School, Detroit, Mich., Aug. 28 to Sept. 1. The program, in so far as it was of particular interest to electric railway men, was given in the Aug. 12 issue of this paper, page 238.

An abstract of the paper read on Wednesday, Aug. 30, before the electric railway section by Frank R. Coates was printed in the Sept. 2 issue, page 328.

INSTRUCTIVE DISCUSSION AT WEDNESDAY LUNCHEON

"The aim of safety work is the reduction of preventable accidents and illness that results in injury to the human body in order that something may be added to the sum total of human happiness," was the statement of Alex. Dow of the Detroit Edison Company in his opening words at the joint luncheon of the public utility and electric railway sections on Wednesday. He said that there was no room for discussion of aims, but that there was a wide field for the discussion of methods, warning his hearers that the fixation of methods in the form of law or codes can hinder rather than advance safety work. He expressed no patience with the man who balances life and limb against expense accounts and declared that industry must carry its own accident bill. In any movement the error of judgment and the benefit of the doubt must be in favor of human life and welfare. As a better remedy for the prevalence of carelessness of industry as to safety measures he advocated a stiff charge to cover the cost of compensation to those injured in accidents and a minimum of state interference in the form of codes and inspection. That such a charge would strike the man in the position to control safety work and be a more effective way of getting action was his expressed belief. The hope in the future for safety work he declared lies with the children, and they should be taught personal responsibility that would lead to more caution and respect for the rights and safety of others.

Arthur W. Brady of the Union Traction Company of Indiana at the same luncheon said that the street railways of the country come into more intimate contact with the public than any other industry and therefore are more interested in safety work than any other industry. They carry sixteen times as many passengers as the steam roads and exceed the estimated number of people carried in automobiles by 100 per cent. "The automobile has increased the hazards to the street railways," said Mr. Brady, and he classed the apparent indifference of the public to safety as one of the discouraging features of the efforts of the street railway companies to promote safety in their operation. He pointed out as an evidence of this carelessness and indifference the statistics that showed in the year 1920 20 per cent increase in fatalities due to the automobile as against a 13 per cent increase in the number of machines registered. As one of the hopeful elements in the situation he pointed to the 20 per cent decrease in the number of fatal accidents in the street railway field in the years 1920 and 1921. The activities of the Safety Council were given as another hopeful sign. Mr. Brady told his hearers that safety work must not be looked on as simply an adjunct of railway operation, but must be made a part of the business and lived in the every-day operation of the system.

In the separate session of the railway and utility sections, the membership reports showed that the electric railway membership of the National Safety Council had increased during the year from 109 to 113 and the public utility section from 120 to 142. The committees in making their reports called attention to the small portion of the total number of utility and railway companies represented in this organization.

In the general session on Monday Dr. R. M. Little, director of rehabilitation of the New York State Railways Department of Education, took to task some of the insurance companies' managers whom he classed as hard boiled in their handling of casualty cases. While he stated distinctly that for the present, at least, he did not believe the insurance companies could be eliminated from the handling of compensation insurance, he declared that court decisions had established compensation as a justifiable tax on industry and said that the insurance companies were handling insurance of this kind as a matter of courtesy, and not one of right. This condition he declared placed on such companies an obligation for service in the handling of claims to which they had not fully risen, even though many companies had done wonderful work. He cited the barring of insurance companies from seven states in this class of business and the agitation for similar action in others as a warning to the insurance companies that they must give service and not stand on technicalities in the settlement of claims.

OTHER CONTRIBUTIONS AT WEDNESDAY SESSION

A sum of $20 and a uniform for each of 350 men at the end of the first year of its organized safety work and a large reduction in accident and injury cases in the eighteen months in which the work has been organized, was the record submitted by H. M. Keyser, Washington Railway & Electric Company, Washington, D. C., in discussion of methods of promoting safety at the meeting of the electric railway section on Wednesday. In the period of eighteen months collisions have been reduced 68 per cent, no-report accidents 50 per cent, serious personal injuries and all other personal injuries 42 and 28 per cent respectively, claims 31 per cent and deaths 66 per cent. The plan used requires the organization of the men into teams. At the end of each three months each man with a clear record receives a prize of $5, with a new uniform at the end of a year of clear record. In the period of eighteen months accidents to other employees in the company have been reduced 52 per cent and damage costs, that in 1918 and 1919 totaled 7 per cent of the gross receipts of the company, have been reduced so that at the present they are running at the rate of 4½ per cent for the current year. The safety work started with 280 cases in court and a total in litigation of $3,500,000, which has been reduced to thirty cases and a total of $250,000. In handling the work the teams organized a contest for a banner, which is awarded every three months to the team having the best record. In determining the awards to the individuals and teams each accident or injury case is carefully investigated and the personal responsibility of the men involved determined. An appeal and review of each decision is provided for.

B. D. Haskins, Chattanooga Railway & Light Company, outlined the system used there, in which all the employees of all departments interested are thrown together and captains, either elected or appointed, are permitted to choose team members in rotation to avoid unfair grouping of employees in the various teams. The departments participating cover the car and power house men, shop men and some of the track men. None of the foremen are allowed to participate. For two four-month periods each year, with a two-month intermission, the teams contest for fixed sums. Failure on the part of individuals to report accidents results in the individual losing half of his award for the first case and all for the second case. The team of which he is a member is also penalized for such failures. New captains are elected and new teams formed for each four-month period. The injury and damage costs on the system were said to have been reduced from 17 per cent of gross in 1917 to 3½ per cent at the present time.

In the discussion of educational methods in the public schools, copies of a course of study in safety were submitted that has been compiled by the Community Traction Company, the Toledo Edison Company and the Toledo Automobile Club for use in the public schools at Toledo, Ohio. The outline of subjects covers safety in the home, school, the street, public places and the entire range of probable conditions under which the child is liable to encounter accidents. It was also stated in the discussion by M. W. Bridges, safety engineer Chicago Elevated Railroads, that a similar course is being prepared for use in the Chicago schools. It came out in the discussion that a number of companies seeking to promote such studies have encountered objections from teachers that the courses are already full and to introduce the subject means upsetting the entire plan of work. H. O. Allison, Beaver Valley Traction Company, outlined a method used at Rochester, Pa., to overcome this objection. Once a week a specially prepared safety story is sent to each room in the school for the teacher to read to the children. In another case a specially prepared poster showing the ways in which accidents occur was prepared and, following talks to the children, the posters were distributed. The pupils were asked to make their own accident posters on the back of these prepared posters, enlisting the aid of parents or others, if they cared to, and using magazine clippings, drawings or any other means that produced results in the preparation of the posters. Out of 2,500 posters thus handed out, 1,500 were returned as the work of the school pupils. Mr. Allison said that his experience indicated that carefully prepared talks were most effective in reaching the children. One of the features of the electric railway section meeting was the presence, with Mr. Allison, of the entire safety committee of sixteen members of the Beaver Valley Traction Company. The entire committee appeared dressed in white.

As essential to successful safety work, C. B. Scott of Chicago declared that conversion of the "boss" was the first. The second was an organized force. One man, he said, could not carry the entire burden, but must have enthusiastic assistance. In this connection he characterized the greatest evil in safety work as a lack of intimate touch on the part of the safety organizations with the other departments of the company. This touch must be personal, and not that of a man confined to a desk who has only an academic interest in the work of the employees. Sympathy for and understanding of the problems of the employees, he said, was the only way in which success could be gained. The third essential he gave as operation according to rules laid down, meaning by this the formulation of such safety rules as experience had shown necessary and strict adherence to them.

A lively discussion on the use of suggestions for safety or improvement of operating conditions took place and M. W. Bridges of Chicago outlined the method in use on the Elevated Railroads in Chicago, under which some 3,800 suggestions have been submitted and 68 per cent of them accepted and used. As soon as received the suggestions are acknowledged and submitted to committees representing the departments affected and then to division committees, and finally to the central safety committee. If finally accepted the employee who made the suggestion is notified and orders are at once placed for any needed material. The man who made the suggestion is kept advised of the progress of the work and on its completion is advised and asked to inspect the work. The object throughout is to make the employees feel that the suggestions are welcome and that there is no delay in handling or no inattention to the things suggested by reason of a feeling on the part of some one in the organization that they are of little or no importance. Every effort is made to encourage such suggestions. When disapproved the employee is given full reasons and has the right to come back with his own reasons for adoption if he feels that anything has been overlooked.

Asserting that a careful man is the best safety device, Britton I. Budd, president Chicago Elevated Railroads, declared that the only safe and careful man is the contented man. Mr. Budd's paper will be published in an early issue.

W. H. Boyce, Beaver Valley Traction Company, New Brighton, Pa., said that one trouble with the street railway business is the prevalence of low salaries. He took the position that the cheap man is expensive because he does not have the ability or the will to meet the problems put up to him. He criticised the class of executives who are deaf to the human side of the business and said

Recent Views of the Municipal Pier at Chicago, Where the Convention Is to Be Held

AT TOP, CONVENTION PIER FROM THE LAKE. IN CENTER, INTERIOR VIEW, GIVING A GOOD IDEA OF THE IMMENSITY OF THE PIER. AT BOTTOM, SHORE END OF THE PIER that executives or others who do not exercise courtesy or self-control in dealing with those under them cannot expect their subordinates to be courteous or considerate of the public. Co-operation with employees to better conditions he said is the first essential to success in safety work. He advocated such measures of consideration for employees as lemonade on hot days, coffee on cold, for those called upon to work overtime or under trying conditions. A small loan sum for the accommodation of those who would otherwise fall into the hands of the loan shark was advocated, and he declared himself in favor of free life insurance, medical advice and also legal assistance in the methods of preparing family budgets, accident insurance and a strict observance of the golden rule in dealing with employees as the best means of promoting safety work.

The officers of the electric railway section for the coming year are: Chairman, John H. Truett, director of safety, United Railways & Electric Company, Baltimore; vice-chairman, G. T. Hellmuth, claim agent, Chicago, North Shore & Milwaukee Railroad, Chicago; secretary, M. W. Bridges, safety engineer, Chicago Elevated Railroads.

Overstorage of Coal Deprecated

UNDER date of Sept. 5, John Price Jackson, representative in Washington of the joint fuel committee of the national utilities associations, sent the following letter to J. W. Lieb of the New York Edison Company, chairman of the committee:

> Secretary Hoover today asked me to convey his request that the utilities of the country co-operate in the present emergency by refraining from obtaining more coal than is required for current needs, and only carry such storage as is essential for safe current operation.
>
> There is already a car shortage in certain districts of the country. Opening the anthracite mines, using up the large number of idle coal cars now available, and the increased demand which will be occasioned by longer nights and approaching cold weather will tend to continue the shortage or make it more acute.
>
> Secretary Hoover believes that only by care for the present, on the part of all, not to exceed current demands can the country be satisfactorily supplied with fuel.

Arkansas Utilities Association

THE executive committee of the Arkansas Utilities Association has selected Oct. 9 and 10, 1922, for holding the convention of the association. The headquarters will be the Eastman Hotel, Hot Springs, Ark.

Safety at Canadian National Exhibition

THE Ontario Safety League has been assigned 1,200 sq.ft. of space for a safety exhibit at the coming Canadian National Exhibition. H. H. Couzens, of the Toronto Transportation Commission, has had built especially for this exhibit a section of a passenger car to enable the league to demonstrate safety in connection with street car traffic. Another feature will be daily demonstrations by Boy Scouts of resuscitation from drowning.

American Association News

Transportation to the Chicago Convention

ARRANGEMENTS are being made by the transportation committees of the American Electric Railway Association in different parts of the country for special trains to the Chicago convention. Where there will not be a sufficient number of delegates to warrant a special train it is hoped that at least a special car or cars will be available to carry the delegates to Chicago.

There will be two special trains from New York. One will be on the Pennsylvania Railroad and will connect with cars from Baltimore and Washington. The other will be on the New York Central and will be met at Albany by the contingent from Boston. The Pennsylvania train will be known as the "Red Special" and will be run as a section of the Pennsylvania Limited, train No. 5. It will leave New York at 11:05 a.m. on Saturday, Sept. 30, and will reach Chicago at 9 a.m. Sunday, Oct. 1. Other leaving times for this train are: Philadelphia 1:16 p.m.; Harrisburg, 3:32 p.m., Pittsburgh, 10:15 p.m. The connecting cars from Washington and Baltimore will leave the former city at 11:45 a.m. and the latter city at 1 p.m. A circular will be issued explaining how tickets for this train may be purchased.

The New York Central train will leave New York about midday on Saturday, arriving in Chicago Sunday morning. A later announcement will give the exact times of leaving and arriving. Besides the provision for the passengers from Boston already mentioned, the train will make a number of stops in central New York to take delegates from those points.

William R. Alberger as chairman of the Pacific Coast transportation committee has arranged for a special car to be attached to the "Pacific Limited," leaving Oakland Pier on Sept. 28. It will travel via the Central and Union Pacific Railroads and the Chicago, Milwaukee & St. Paul Railway. Passengers en route can board the train at Ogden, Cheyenne and at several other points.

Delegates from the Southland will be served by the "Dixie Special," made up of special cars attached to the "Dixie Flyer." This train will leave Atlanta at 8:45 a.m. Saturday, arriving in Chicago Sunday at 7:45 a.m. It will go by way of Chattanooga and Evansville. It is in charge of Charles S. Banghart.

E. P. Meissner is planning for special cars to be run from St. Louis. The schedule for these will be announced later.

Entertainment at Chicago

PLANS for the entertainment of visitors to the annual association convention were completed at a meeting of the entertainment committee in the office of the Chicago Surface Lines on Aug. 30. Members present were: J. V. Sullivan, chairman; H. J. Kenfield, J. T. Jenks, W. J. Beattys, Thomas Finigan, Harry L. Brown, C. W. Register, John Benham, E. E. Kretschmer, F. E. Johnson, and J. E. Wilkie. J. W. Welsh and Labert St. Clair of association headquarters also were present.

The principal work of the meeting was the completion of entertainment for the ladies. It was decided to serve tea and have a musical entertainment on the Pier every afternoon of the convention. On Tuesday, Oct. 3, the ladies will be given a free automobile ride around the park system. On Wednesday visitors will be admitted to the Art Institute and on Thursday to the Field Museum without charge.

The special feature night committee, of which Mr. Johnson is chairman, reported that it had completed arrangements for the dinner and home talent show to be held at Marigold Garden on Wednesday night, Oct. 4. The special feature of this occasion will be the presentation of the musical comedy "An Interrupted Operation," or "Hortense Horsesense Saves the Day." This skit, which has been written by Mr. Wilkie, is declared to be one of the cleverest amateur offerings ever prepared for the edification of convention visitors. Men and women connected with the electric railway industry will take all the parts. The sketch will run about thirty minutes. Mr. Johnson reported that applications for tickets to the dinner and carnival already were being received in large numbers. The total cost will be $5 per plate. The dinner will start at 6:30 p.m. and the show will open at 8 o'clock. Informal dancing will follow the show. Marigold Garden, which is located at Broadway and Grace Streets, is particularly well suited for the dinner and carnival. The dining room in which the festival will be held has the greatest seating capacity of any in Chicago.

The reception will be held on Monday night at the Drake Hotel, and the annual ball will be held on Thursday at the same place. Benson's orchestra, one of the most famous in the United States, will furnish the music for all convention entertainment, both on the Pier and at the hotel.

Arrangements have been made with six golf clubs to extend their privileges to all convention visitors. It is hoped that additional clubs will extend their privileges.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Grant Before Stockholders

Louisville Franchise Will Go Into Force Upon Acceptance by Security Holders

The question of approval of the new franchise for the Louisville (Ky.) Railway will come before the stockholders of the company at a special meeting called for Sept. 11. The objects sought to be accomplished under the new grant are, perhaps, best covered by the preamble to the measure itself, which follows:

> An ordinance providing for an adjustment of the franchises of the Louisville Railway; recognizing the rights of said company to operate over certain streets now occupied by it; requiring a surrender of all other street rights; providing for uniform operation under regulation by the Board of Public Works with recourse to arbitration; protecting the rights under outstanding mortgages and rights of present and future owners of Louisville Railway securities; establishing fare schedules and method for their application; setting out general construction, maintenance and operating regulations; with penalties for disregarding the provisions of this ordinance.

GOOD WILL MAINTAINED DESPITE LONG-DRAWN-OUT CONTROVERSY

Thus the closing chapters would appear to be about to be written soon in a controversy that has extended over many months. Throughout it all, however, despite the appeal to the courts and the submission and resubmission of proposals by both sides, a spirit of good will has been preserved. As for the franchise itself it is exactly what the preamble states it to be, namely, an attempt to readjust franchise conditions. Until the measure has gone into effect, the need would not seem to exist to do more than touch upon some of the high spots of the ordinance. Acceptance cannot be accomplished until the stockholders have approved the grant and formal acknowledgment of it has been filed with the city by the company after due authentication.

The franchise of the constituent lines of the Louisville Railway differ in respect to operating rights and conditions. For this reason all these old grants are swept into limbo under the new proposal and in their place is substituted a grant with a uniform term of twenty years.

The company is now charging a 7-cent fare. The right to charge such rate is in dispute before the courts. Under public regulation as provided in the new grant the initial fare beginning with the enactment of the ordinance and ending with Dec. 31, 1923, will be 7 cents cash with five tickets for 30 cents. Thereafter the fare will be changed from time to time in accordance with the amount in the stabilizing fund, varying between 5 cents cash with six tickets for a quarter under schedule A to 7 cents cash with five tickets for 35 cents under schedule F. There will be a sliding return to the company varying between the limits of 5 per cent and 7 per cent.

The recognized capital of the company as to Jan. 1, 1923, is to be $20,542,600, consisting of $8,719,000 of bonds and notes, $3,500,000 of 5 per cent preferred stock and $8,323,600 of common stock. The initial contribution of the company to the barometer fund is to be $350,000.

All disputes arising under the terms of the grant are to be settled by a board of three arbitrators.

Increase of Three Cents an Hour Granted

A strike was averted recently on the lines of the Chicago, Aurora & Elgin Railroad, Aurora, Ill., when the management at virtually the last minute granted a wage increase of 3 cents an hour to trainmen, ticket agents, freight handlers and switchmen. The new wage scale will be 63 cents an hour for first year trainmen, 67 cents for second year men and 70 cents for third year men. The new pay is retroactive to July 1.

The trainmen had originally asked for a 30 per cent increase or 20 cents. After the company had refused this the men offered to compromise on 5 cents. This was also refused with General Manager McClure suggesting arbitration. Before the meeting of the employees at which a strike vote was to be taken members of the international executive committee of the Amalgamated and of the railway's executive committee conferred and decided on the agreement of 3 cents an hour increase.

Compensation Bill Up in District of Columbia

The District of Columbia workmen's compensation bill, which combines features found in similar laws of various states, probably will not come to a vote in the House until the December session of Congress, according to its author, Representative Roy G. Fitzgerald, Dayton, Ohio. Opposition to the bill has centered principally against its insurance features, which contemplate creation of a fund by the District of Columbia government, to be administered by the United States Employees' Compensation Commission, which has charge of compensation for Federal employees and public employees of the District, and against its broad scope. In effect, the bill is a compulsory insurance measure. Its provisions include all employers and employees in private industry and business within the District of Columbia, including public service corporations and bus lines, without regard to hazard of occupation.

Service-at-Cost Sustained

New York Commission Sees Nothing that Contravenes Law in New Rochester Grant

Under the authority conferred on it by Chapter 582 of the Laws of 1922, the Public Service Commission announced on Sept. 3, that it had approved, upon petition of the city of Rochester, the contract between the city and the New York State Railways for service-at-cost transportation. The existing contract has been in operation for two years and it was recently attacked, the principal objection stated being that through it the commission lost for all time and for all purposes supervision of the operating company.

This the commission contended was not so. It held that:

> In all respects and in all regards the Public Service Commission maintains the jurisdiction and exercise of its regulatory powers over all matters of extension, service, safety of appliances and equipment, improvements, facilities, capitalization and accounting, propriety of regulations, practices, as fully and as completely as heretofore, and that upon complaint of the municipality, the railway or any citizen or upon its own initiative it may institute a hearing and make a determination thereon under its delegated powers. Any and all acts of the commission or the company under the contract in these regards are subject to review.

Objections to approval were made by the Monroe Democratic Club, the chairman of the Monroe County Democratic committee and its laws committee and the Rochester *Times-Union*. In a memorandum Commissioner Van Voorhis says:

> The objection is that the Public Service Commission is without jurisdiction to approve the service-at-cost contract in so far as it permits a rate of fare above 5 cents for each person, or to permit any increase of fare above that rate. This raises a question of law which must be submitted to the proper tribunal for determination. This commission is without power or jurisdiction to determine the legality or validity of statute law. It must take the law as expressed in legislative enactments. The amendment to the Public Service Commission law expressly gives the Public Service Commission power to approve a service-at-cost contract as defined by the act or any agreement purporting to be such a contract. It may, however, be fit and proper for this commission to state that it knows of no rule of law which forbids parties to a contract, even though one be a municipal corporation, from modifying by mutual consent the terms of their contract.
>
> The amendment of the Public Service Commission law of 1921 empowered the commission to determine just and reasonable rates, notwithstanding a higher or lower rate had been theretofore prescribed by statute, grant, franchise or other agreement.

Commissioner Van Voorhis discusses street railway conditions in Rochester prior to the making of the contract, saying that for some time the railway and its operations were "in a chaotic condition." The service was bad and revenues were insufficient under a 5-cent fare to meet operating expenses and taxes and yield a fair return to investors. In the Quimby case the Public Service Commission, Second District, refused to order the railway to improve its service under a 5-cent fare, on the ground that such requirement would result in the confiscation of the company's property. It was there shown that the actual deficit for 1919 in the city 5-cent fare zone was $643,171.

The contract became effective on Aug. 1, 1920, to continue for ten years with option to the city to renew for a further period of ten years. Commissioner Voorhis says:

> One of the objections urged to the approval of the contract is that the Commissioner of Railways in Rochester is granted too much power, and in fact so much that he may abuse such power to the injury of the traveling public and bring about poor service or an unwarranted increase in fare or a continuance of a fare too large under the provisions of the contract. We see no merit in this objection.
>
> We believe the people of the city of Rochester, as occasion may arise, through their Mayor and Common Council, will select for Commissioner a man of ability and integrity whose sole aim will be the zealous purpose of discharging the duties of its office as they are defined by the contract and in the interests of the public of Rochester. If any mistake is made in such selection it can be remedied by removal of the commissioner.
>
> As provided by the contract the company's property was appraised by men experienced in making this class of valuations. They valued the property at $19,216,000, and there was no appeal.

Commissioner Van Voorhis says the contract provides that under a 7-cent fare the company is entitled to a 6 per cent, yearly return; under a 6-cent fare, 6½ per cent; at a 5-cent fare, 7 per cent; at a 4-cent fare, 7½ per cent, and under a 3-cent fare, 8 per cent. He then says:

> Under the provisions of the contract the rate of fare is flexible, within the limits of 3 and 10 cents. It automatically changes as the balancing fund therein is increased or decreased by excess of revenues over expenditures or expenditures over revenues. Without further reference to the provisions of this contract, it may be stated on the whole that it provides a reasonable, lawful and proper arrangement for the operation of the street railway system in the city of Rochester. All of the objections have been considered and there are but two other than those mentioned to which we deem it necessary to refer.
>
> In regard to the power of the commission over rates by approval of the contract we determine the rate fixed thereby and the automatic method of change as therein provided to be just and reasonable. The commission retains its supervisory powers of the accounting of the company and it may disallow or reject charges made improperly to any accounts; for instance, capital or operating expense.
>
> Objection is raised to the power granted to the commissioner to make a charge for transfers. This power we believe is subject to the provisions of the Railroad law and the Public Service Commission law. In that regard, and on complaint or on the commission's own motion, an investigation can be had concerning the propriety of any charge for a transfer.

Scale of Fifty-two Cents

The agreement entered into some time ago between the management and employees of the Pennsylvania-Ohio Electric Company, New Castle, Pa., will terminate on June 1, 1923. According to the provisions trainmen in the employ of the company more than one year will receive 52 cents an hour; those in the employ of the company less than one year and more than three months will receive 46 cents an hour, and trainmen in the company's employ less than three months will receive 43 cents an hour. Safety car operators will be paid 57, 51 and 48 cents an hour according to the length of service.

New Road Nearly Done

Texas Interurban Will Meet Changed Conditions Surrounding Electric Railway Operation

Announcement has been made by Richard Meriwether, vice-president and general manager, that the new interurban railway line between Dallas and Terrell will be ready for operation about Dec. 1 next. This line is being built by the Texas Construction Company under a contract to turn over a single-track interurban line complete and ready for operation between Dallas and Terrell.

Terrell is almost directly east of Dallas. The country is generally level and the line is almost straight. There is a tangent of 12 miles between Terrell and Forney and one of 6 miles between Dallas and Forney. The grade is not to exceed 2 per cent except where the line crosses the Texas & Pacific Railroad overhead.

LINE WILL RUN THIRTY-ONE MILES

The length of the line between the interurban station in Dallas and the station in Terrell is 31.5 miles. Between the city limits of Dallas and the city limits of Terrell it is 27 miles. The line passes through Mesquite, 12.1 miles east of Dallas, and Forney, 19.7 miles east of Dallas. The density of population along the line will average about 1,200 to the mile.

The track is laid in double-track position. It is of standard gage with 70-lb. steel rails laid on 6 x 8 x 8 oak ties spaced on 2-ft. centers. Specifications for the double track call for gravel ballast with at least 6 in. under the ties. There are 4,800 ft. of timber trestles and three steel span steel bridges between the city limits of Dallas and the city limits of Terrell. The right-of-way for the entire distance is 100 ft. wide.

Five passenger and two express interurban cars have been purchased.

It is planned to operate the cars as one-man cars except during periods of congested travel such as may require a conductor. These cars are to weigh not more than 30,000 lb. complete. With lightweight cars operated by one man and with power supplied by automatic substations the line should be operated with a minimum expense both for maintenance and train operation. Mr. Meriwether said:

> During these days of improved highways and bus lines a project of this kind is of more than passing interest, and the construction, design and proposed operating methods of this particular line meet, as far as possible, the changed conditions now surrounding the interurban railway business.

It is planned to make the run between Dallas and Terrell in one hour and twenty minutes, with ten minutes layover time at each end of the line. It will therefore require three cars to maintain an hourly schedule.

Construction as well as specifications and design of this railroad has been under the direction of Richard Meriwether, vice-president, and R. R. Brown, chief engineer, of the Texas Construction Company.

The new line is one of the two lines which the owners of the Dallas Railway agreed to build in a contract with the city of Dallas in 1917. Each of the two lines is to be not less than 30 miles in length. Terrell was decided upon as one of the routes and construction began last year.

Franchise Abolishing Tax Is Rumored

Repeal of the franchise of the Cincinnati (Ohio) Street Railway to operate in Cincinnati is the object of a petition drawn up by Attorney Robert S. Alcorn, asking for a special election to submit a repealing ordinance by referendum. The position will not be submitted to signers until it is determined what action Mayor George P. Carrel's street railway committee may take to solve the local traction difficulties, Mr. Alsorn said.

According to Attorney Alcorn there appeared to be a movement on foot to have the Mayor's committee recommend a new ordinance to the Council to abolish the franchise tax of $350,000 a year which the traction company must pay the city. He said that if the Council should pass an ordinance abolishing the franchise tax, he would include in the initiative ordinance a clause providing for the repeal of that ordinance. A denial that any such action in abolishing the tax was contemplated by the committee was issued by Mayor Carrel.

"What Is Accident Prevention" Answered

Seventeen answers to the question "What is Accident Prevention" featured an address on that theme, delivered recently by Garry S. Willis, assistant general manager of the Wheeling (W. Va.) Traction company.

Statistics on the needless and criminal waste of human life through disregard of the most ordinary precautions by individuals and concerns were offered by the speaker in his advocation of the safety first conditions, which included figures which show that while automobile accident fatalities have increased 89 per cent in the past five years, street car fatalities during the same period actually decreased 15 per cent, until street car travel is now the safest in the world.

Printing Transfers in Chicago

The Chicago Surface Lines conducts its own transfer printing shop. During the year ending Jan. 31, 1922, this shop printed, in addition to forms and notices used by the company, 1,588,350,000 transfers at a total cost of $147,732, or 9.3 cents per thousand, as compared to 12.57 cents per thousand for the previous year. Included in this year's transfers were 114,720 transfers costing $10,669 printed to comply with the order of the Federal Court requiring the giving of a transfer to each cash passenger for use as a rebate slip in case the 8-cent fare had not been sustained

Mr. Mitten on Buffalo

Says Buffalo Men, Misled by Arrogance, Are Facing Winter with Dull Prospect Ahead

Failure on the part of the municipal authorities to prevent the operation of jitneys in Buffalo in defiance of an injunction order and in contravention of the state law has forced the International Railway to bring about wholesale arrests of jitney drivers. The first cases, brought into court last week, were adjourned until after the decision of Justice Crosby on the application of the jitney owners to have the injunction vacated.

In a statement on the Buffalo situation made to the resident correspondent of the *Electric Railway Journal* in Buffalo, Thomas E. Mitten, chairman of the board of directors of the International, said:

> American laws make of America the land of greatest opportunity for the ordinary man, but American institutions cannot continue to exist unless American-made laws are respected and enforced.
>
> Unionism cannot continue, as a part of legitimate American industry, so long as it neither recognizes the rights of property nor the right of every man to decide for himself which course of action, or employment, will afford to him and his the greatest measure of happiness and prosperity.
>
> Unionism, of the kind that dynamited International street cars, is by us condemned—beyond the power of resurrection by arbitration or otherwise, and those so short-sighted as to lend their names to such endeavor surely misapprehend the enormity of this offense against the law and against humanity.
>
> Unionism run rampant, dictating to men and management alike, paralyzed Buffalo by striking during the war, and destroyed millions of International property values. Buffalo carmen, misled by arrogance, are facing the coming winter with neither money nor jobs.
>
> Mittenism—men and management—four-square for Americanism, supplied Philadelphia uninterrupted service during the war. P. R. T. men and management, co-operating for efficiency, have earned the respect of Philadelphians, saved P. R. T. from threatened receivership and rehabilitated it for its owners. P. R. T. employees saved their war-time wages, secured participation in the result of their extraordinary economic accomplishment and are today proud possessors of nearly $5,000,000 in saving fund securities and in the par value, 60,000 shares, of the property which they are helping to operate economically.
>
> Dynamiting outrages are cowardly crimes condemned by all good citizens.

Henry W. Killeen of Penney, Killeen & Nye, of counsel for the International, has taken an appeal from the decision of Justice Frederick W. Krause of the appellate division handed down at Olean on Aug. 14, holding that the city's action of appealing the mandamus order obtained by the railway against the Mayor directing him to enforce the law against jitneys automatically stayed the effectiveness of it. The International in taking its appeal to the New York State Court of Appeals contends that the Krause decision should not stay the mandamus order.

Because of the attitude of Mayor Schwab and other municipal authorities about 1,000 of the foremost business and professional men and women of Buffalo have organized a Law and Order League for the sole purpose of using its influence to maintain law and order in Buffalo.

There has been no local service in Niagara Falls since the strike became effective on July 1, but it is proposed to resume service about Sept. 13.

Department of Justice agents in Washington and Buffalo have been ordered to investigate the dynamite outrages on the high-speed line between Buffalo and Niagara Falls and are co-operating with the secret police of Mr. Mitten. The chairman of the board of arbitration and former president of the Central Labor Council of Buffalo and five striking employees of the International are under arrest on the charge of unlawful possession of dynamite.

Saginaw Considers Bus Proposals

Saginaw City Council, in an effort to solve the transportation problem which has been giving the Michigan city trouble since the Saginaw-Bay City Railway suspended service more than a year ago, is considering two proposals for bus transportation. One has been made by T. J. Fay, Rockford, Ill., and the other by the Saginaw United Transit Company, which is the outgrowth of the bus operators of the city.

Mr. Fay has presented an ordinance to the City Council which provides for a 6-cent cash fare, five tickets for 25 cents, universal transfers, and eight school tickets for 25 cents. The Saginaw United Transit Company, which is planning to incorporate for $250,000, proposes a 5-cent cash fare, six tickets for 25 cents, eight school tickets for 25 cents, and transfers for 2 cents.

Hearings Announced on Mayor's Plan

Mayor Hylan of New York on Sept. 6 presented his $600,000,000 subway plan to the Board of Estimate at a special meeting called for the purpose. After having the clerk of the board read the statement in full in which the plans were explained, the dates of hearings on individual routes were announced. The first one will be held on Sept. 15 and the last one probably on Oct. 10.

The Mayor took another fling at the Transit Commission, from which he said nothing could be expected in the way of transit relief. Pointing out the need for subway extensions, the statement said in part:

> The greatest congestion exists in the lower part of Manhattan Island because all subway lines from Harlem, the Bronx and Washington Heights converge there, and trains are crowded before they reach 125th Street southbound in the mornings and before they leave Fourteenth Street northbound in the evenings.
>
> The plan which I have will relieve transit congestion in Manhattan and will provide adequate rapid transit in all boroughs for many years to come.

The Mayor then reviewed the plan giving all the proposed routes as announced previously, and emphasizing its supposed advantages over the Transit Commission's plan.

At the first hearing the routes which are intended to serve the Harlem, Washington Heights and the Bronx districts in upper New York City will be considered.

Governor Urges Better Service Plan Put Into Effect

Governor Channing Cox of Massachusetts has conferred with the boards of public trustees of the Boston Elevated Railway and the Eastern Massachusetts Street Railway about leases or consolidations that would result in better railway service for Hyde Park, Chelsea and Revere. He has urged the two boards to come to an agreement under which the Boston Elevated could operate the lines in Hyde Park, in Chelsea and Revere, and on Aug. 31 he presented the matter to the Massachusetts Department of Public Utilities.

The proposition advanced is that the Boston Elevated should take over the lines of the Eastern Massachusetts both in Hyde Park and in Revere and operate them, either under a lease or a merger, so that the people in Hyde Park could have a single fare into Boston and the great bathing beach at Revere could come within the single fare zone of Greater Boston. It is understood that the railway trustees are not averse to the principle, but they cannot agree on terms. The Eastern Massachusetts has an abandoned power station in Hyde Park and it wants this figured into the value upon which to base the rental. Similarly in Revere, at the other end of the elevated, the Eastern Massachusetts would be willing to relinquish its property to the elevated if the poor lines were taken with the good ones at a satisfactory price. It all depends upon terms.

All parties are agreed that from the operating point of view the Boston Elevated should take over the service of the Eastern Massachusetts both at Hyde Park and at Revere, thus establishing a Metropolitan District Railway, to manage as a single unit all the electric railway lines in the district and at a single fare.

This has been urged so much and came so near being enacted into law during the year's session of the Legislature that it is firmly believed it will come eventually. Provisions for it were contained in the bill which was offered in the Legislature and submitted to the Department of Public Utilities. Governor Cox's intervention at this time is expected to expedite the negotiations.

Appreciation for Utilities Expressed

An indication of the attitude of the business people of Pine Bluff toward Pine Bluff Company and the Arkansas Light & Power Company was expressed in a double page spread in the *Daily Graphic* on Sept. 1. The occasion for the congratulations and felicitations was the expansion of the general offices of the companies in Main Street. The furniture company, the jeweler and the druggist took this opportunity to welcome the companies into their new spacious quarters and to show appreciation of the big part played by these utilities in the development of the city.

Agreement on Arbitration Terminates Strike

A strike which has tied up service on the lines of the Boston & Worcester Street Railway since Sept. 3 terminated on Sept. 6 when officials of the company and representatives of the union agreed to submit the wage question to arbitration. With the return of the 300 trainmen, trackmen and repairmen all lines have begun operating on regular schedule.

The men had been receiving 54 cents an hour and the company announced that at the expiration of the agreement on Sept. 1, a scale of 52 cents an hour would be put into effect. When the company refused to recede from its stand of 52 cents the men walked out after running the last cars into the Framingham and Hudson terminals of the company. Pending arbitration the men will receive the scale of wage in effect before the strike.

President Mahon of the Amalgamated Association was quoted by the daily papers as having denounced the calling of the strike and accordingly it was announced that the charter issued to the employees had been revoked with the subsequent penalty to the men of losing all strike benefits. It was denied by Patrick Mooney, president of the local, that he had received an official notice of loss of charter as is usual in such cases. No date has been set for the first meeting of the arbitration board.

Must Protect Employees

As a result of a decision of the Supreme Court of Utah, which held in substance that the railroads of the State do not conduct wholly an interstate business, and are therefore subject to the provisions of the state industrial act, the industrial commission of Utah has ordered the Bamberger Electric Railroad and the Salt Lake & Utah Railroad, both interurbans, with rails entirely within the State, to make proper provision, satisfactory to the commission, forthwith, to protect their employees under the workmen's compensation act. The decision of the Supreme Court upholds the section of the Utah law which provides that the Utah commission shall assume jurisdiction in all cases that do not come within the provisions of the federal employers' liability act.

Akron Viaduct Properly Designed

The Northern Ohio Traction & Light Company, Akron, Ohio, on Aug. 5 made public the report of William H. Adams, the consulting engineer of Detroit, employed for the purpose of making an examination as to the safety of the new North Hill Viaduct with reference to running cars across that structure.

Mr. Adams, in a letter to the company, says he has made "a complete examination of the structure and investigated the conditions which surrounded its construction." He reports that he has made a careful study of the daily and weekly reports of the engineers used in the building of the viaduct and also examined the reports of the tests of material used. He checked the design for the entire superstructure, all the foundations and several typical arch rings. He declares that it is his conclusion that as far as railway use is concerned, the viaduct is conservatively designed, properly constructed and amply safe for the loads which the street railway operations will involve.

"In a Street Car"

The Oregon *Daily Journal*, Portland, Ore., under date of Aug. 1 published the following editorial.

> So many things have been said about the joys of motoring that a word for the lumbering, rumbling old street car may not be construed as the voice of favoritism.
>
> On an interurban car three Portland men who own and are amply able to operate their own cars were talking. Said the first:
>
> "I don't drive my car to the office once a month. Whenever I drive it downtown and leave it parked on the street it is on my mind more or less all day. As I come and go on the interurban I get almost my only chance to read the papers. I meet and chat with my friends. I have a chauffeur, the motorman, and a general manager, the conductor. If I am hurt while driving my own machine the chances are I will get nothing. If I hurt somebody else I will pay heavy damages. But on the car I am responsible for the safety of no one, not even my own, for should I be killed on this car my heirs would be paid $10,000 in the form of accident insurance."
>
> The second of the three business men lost no time agreeing with what had been said. He, too, has lived in the suburbs a long time. But his testimony took the form of a quotation from a paint manufacturer, who had said to him:
>
> "The man who leaves his car on the street all day has no business owning a garage at home. Standing out in the sun and dust kills the paint and takes the life out of the rubber. One day on the street is far more injurious than a week standing out at night."
>
> This, it was argued, may show the economy of using the parking garages rather than leaving the cars on the streets, or at home. But the third man offered what he considered the clinching point.
>
> "They tell me that when I estimate the cost of operating my car at 10 cents a mile I am apt to be under rather than over the actual amount, including gasoline, oil, tires, repairs, repainting and depreciation. I live nine miles from the office. At that rate it costs me $1.80 a day merely to come and go. My commutation fare on the interurban, round trip, is less than 25 cents. I can do a lot with that $1.55 a day that I save if I ride on the street car."

News Notes

Mr. Witt Engaged by Toronto.—Peter Witt, Cleveland, has been brought to Toronto, Ont., by the Toronto Transportation Commission to make a thorough investigation into the operation of the Toronto municipal railway system, with a view to bringing down the fares.

Seventy-three Cents an Hour Accepted.—Train and shop men of The Chicago, North Shore & Milwaukee Railroad recently settled their wage differences with the road by accepting the company's final offer of the same wage now in effect, to stand for two years. Under the accepted settlement trainmen will receive 73 cents an hour.

Railway Men to Assist Police.—The receivers of the Memphis (Tenn.) Street Railway will be asked to request the employees of the company to co-operate with the city's officials in the matter of traffic violations by reporting such accidents and violations as come under their observation. Judge Ross of the Federal Court recently issued an order requesting this action.

Service Same as Usual.—Henry L. Doherty & Company report that the net earnings of its public utility division for July were especially good in view of the coal situation. Adequate supplies of coal were kept available so that service in no case was jeopardized. It was the company's policy at the beginning of the coal strike to carry enough fuel in storage to take care of its needs for a considerable period ahead.

Franchise Tabled.—The Board of Public Works of Fort Wayne, Ind., has decided to table indefinitely the proposed franchises to the Indiana Service Corporation which would grant the corporation the right to construct a one-way single track on a number of streets in the northwestern section of the city. It was stated that these franchises were tabled because of the many remonstrances received from residents in this section.

Cities Want to Control Utilities.—Commissioner Harry T. Hartwell of Mobile recently said that he already had been assured of support of a general law which will permit Mobile and all other incorporated cities to control their public utilities, such as street railway, gas and electric light companies, and water works. The control of the utilities would be taken from the Alabama Public Service Commission and vested again in city governments, with which the utilities negotiate for their valuable franchises.

Tells How Louisville Organized for Safety.—"Saving $150,000 Through Safety Work" is the title of an article in the September issue of the *National Safety News*, written by E. F. Kelley, the editor of *Trolley Topics*, official publication of the Louisville (Ky.) Railway. Mr. Kelley reviews the safety undertakings of the Louisville Railway and by means of a chart shows the plan of organization of the safety council of the railway. The story is complete with a cut of James P. Barnes, president of the railway.

Name of Commission Changed.—The Georgia State Railroad Commission ceased to exist the latter part of August and is succeeded by the Georgia Public Service Commission. The action changing the name of the body was taken at the annual meeting of the Georgia State Legislature and became effective upon the signing of the bill by Governor Hardwick. Along with the change in the name an appropriation of $70,000 a year is provided to take care of the commission's expenses. This is double the former annual appropriation, which was $35,000.

Financial and Corporate

Sale Being Negotiated

North American Company Makes Overtures for Purchase of East St. Louis Properties

The North American Company, New York, N. Y., has made arrangements with Dillon, Read & Company, bankers of New York, which may result in its acquisition of control of the East St. Louis & Suburban Company and its subsidiaries. Announcement to this effect was made in New York on Sept. 5. The arrangements for the purchase are, however, conditioned upon the acceptance of the offer which will be made by the holders of not less than 80 per cent of the preferred stock and 80 per cent of the common stock of the East St. Louis & Suburban Company. It is understood that the terms of the offer will be announced during the present week.

The Union Electric Light & Power Company, St. Louis, a subsidiary of the North American Company, has for some years supplied power to the East St. Louis & Suburban Company, and it is pointed out that the offer now being made is a logical step in the development of the utility service of Union Electric Light & Power Company.

LARGE CITY AND SUBURBAN SYSTEM

In reply to inquires made at St. Louis about the deal Louis H. Egan, president of the Union Electric, which with the United Railways, St. Louis, is controlled by the North American, stated that any announcement of the sale would have to come from New York. W. H. Sawyer, president of the East St. Louis & Suburban, also declined to make a statement regarding the negotiations.

Mr. Egan did, however, explain that the cities on the west and east bank of the Mississippi River were essentially one economically and industrially and that it was logical to presume that the apparent industrial growth in store for the east bank could be furthered better by singleness of interest in the public utilities serving both districts.

The Union Electric recently began the construction on the east bank of the river of a 60,000-kw. unit of a new power plant designed ultimately to develop 240,000 kw., or between two and three times the prime power capacity of the Keokuk dam.

In St. Louis it is considered possible that if the sale is consummated, the east side properties of the North American will be placed directly or indirectly under the administration that now conducts Union Electric. The United Railways is still in the hands of a receiver, and reorganization of this property is not expected until after the valuation case is adjudicated. That matter is now before the Missouri Public Service Commission.

The plant account of properties controlled by the East St. Louis & Suburban is $23,474,384, including electric power plants in East St. Louis and Alton, though the company purchases a large quantity of power from Keokuk dam and is connected with the power plants of the Union Company for emergency power.

The gross income of the East St. Louis & Suburban for 1921 was $4,910,414, and its net sufficient to yield 2.3 per cent on preferred stock of which there is $6,000,000 outstanding. The other securities of the company are $6,000,000 of common stock, $8,000,000 in 5 per cent collateral bonds and $2,000,000 in notes.

The East St. Louis & Suburban controls:

East St. Louis & Suburban Railway, which operates 68 miles of electric railways from East St. Louis to Belleville, Edwardsville, Lebanon, Venice, Collinsville and intermediate points.

East St. Louis Railway, which operates 36 miles of track in the city of East St. Louis.

St. Louis & Belleville Electric Railway, which operates 18 miles of coal carrying lines and to which the East St. Louis & Suburban also feeds coal.

The East St. Louis Light & Power Company, which serves East St. Louis with electricity for power and lighting.

Alton, Granite City & St. Louis Traction Company, which operates an electric line to Granite City and Alton from St. Louis.

Alton Gas & Electric Company, which operates the street railways and the electric and gas plants which supply Alton.

In addition, the East St. Louis & Suburban Company owns a half interest in 23,000 acres of coal land contiguous to Belleville.

The extension of North American public utility influences on the west bank of the Mississippi River is indicated by an increase in kilowatt-hours sold through the Union company from 97,060,635 in 1909 to 416,537,929 in 1921. The Union company now sends electricity to more than sixty-five communities in the vicinity of St. Louis in Missouri.

Balance of $226,588 on Municipal Railway in 1921

According to the annual report of the Seattle (Wash.) Municipal Railway, filed with the Department of Public Works, the number of passengers carried on the lines during 1921 showed a decrease in number of 20.92 per cent from the year 1920. In 1921 97,156,839 passengers were carried against 122,866,577 in 1920.

Operating revenues for 1921 were $6,295,564, and operating expenses $5,105,487, leaving operating income of $1,190,077. Non-operating revenue of $51,611 made the gross income $1,241,688. Deductions from gross income of $866,847 left the net income $374,841, from which after delayed gains and losses and other such credits and charges had been figured, a credit balance of $226,588 remained.

Prospects Greatly Improved

Interurban Hurt by Auto Competition Has Bright Prospect Following Reorganization

Finance and Industry, a weekly printed in Cleveland for the Fourth Federal Reserve District, published an editorial in one of its recent issues in which it ascribed the present difficulties of the Cleveland, Southwestern & Columbus Railway as undoubtedly due to the increase in the number of privately-owned automobiles and to competition on the part of bus lines. That paper said:

PROSPECTS AHEAD ARE BRIGHTER

> The privately-owned automobile has kept the earnings of traction companies almost at a standstill for six or eight years, but it is the bus lines, which came into existence since the close of the war, that eventually determined the fate of the Southwestern and are seriously interfering with the earnings of many other interuban lines, as well as some railroads. Of course, a large number of these bus lines will cease doing business eventually, and if they were subject to the same regulation as are the interurban lines, the situation would very soon correct itself.
>
> The bus lines are occupying the highways for revenue without compensation to the communities through which they pass, and it would seem that legislation to regulate the motor bus is very forcibly before us now, so that such injustices as the Southwestern has suffered will not continue until practically all interurbans are forced into receivership.
>
> If the Southwestern obtains a fast terminal in Cleveland, as it expects to do, it will be in a position to eliminate most of its bus competition. The reorganization managers have provided $500,000 for the purpose of connecting the property with the interurban terminal that will run into the new Cleveland Union Station.
>
> If the rehabilitation plan goes through at an early date, it is believed that the present management will be able to put the company in a very strong position.
>
> With increased freight and passenger earnings, growing out of better terminal facilities, the development of light and power business, and the expected economies in operation, the new preferred stock should eventually establish itself in a strong position and the present general mortgage bondholders should eventually come out whole.
>
> There can be no question but that the proposed plan puts the company in a position where it will be able to take care of its needs as far as can be seen for many years to come.

As indicated previously in the *Electric Railway Journal* the underlying bonds will be taken care of under the reorganization without any sacrifice, and $1,500,000 of new money provided, of which $1,000,000 is for new power facilities, new cars and for necessary working capital. It is believed that after these improvements are made, the company will be able to save $100,000 a year in operating expenses.

STOCKHOLDERS LOSE ALL

The company is relieved of the burden of $3,666,000 of 5 per cent general mortgage bonds, and these bondholders will take over the property, receiving preferred stock for their bonds and the equity of the property represented by common stock.

The present common and preferred stockholders receive no consideration in the proposed plan because there is not enough equity or earning power in the present property to take care of the general mortgage bonds, which are, of course, ahead of the stock issues.

Final Steps Taken

Way Prepared for Early Discharge of Receiver of the New Orleans Railway & Light Company

The three enabling ordinances introduced a couple of weeks ago by Commissioner Maloney of the Department of Public Utilities, looking to the reorganization of the New Orleans Railway & Light Company, New Orleans, La., were adopted on Sept. 3 by the Commission Council of New Orleans. Mayor McShane cast the only dissenting vote. The ordinances were adopted as originally introduced, carrying the option clause under which the city is privileged to acquire the public utilities by purchase at any time.

Judge Rufus E. Foster of the United States District Court for the Eastern District of Louisiana has signed the application for approval of the sale of the New Orleans property, as recently effected at public auction. Judge Foster, who is now away, is expected back within ten days, when the sale will be approved by the court, the application having been filed meanwhile, as approved by law. Thirty days after the approval of the sale, the receivership will be lifted, and the new company will assume charge.

Mr. Hecht, chairman of the reorganization committee, has announced that with the approval of the sale of the property a bond issue of $12,000,000 will be placed by the Chase National Bank, New York, representing the junior security holders. The railway has pledged itself to spend $15,000,000 within five years in financing the company and rehabilitating the properties. Of the $12,000,000, $4,500,000 will be disbursed among the security holders of the 4½ per cent bonds who have agreed to accept 25 per cent of the par value of the bonds in cash and 75 per cent in new securities ranking below the new organization bonds. Of this money, Mr. Hecht estimates that $3,000,000 will be distributed in New Orleans.

Two million five hundred thousand will be used in retiring receiver's certificates issued to cover the cost of the 100 new cars recently purchased and the new 20,000 kw. turbine and generator at the power house.

Urges Five-Year Extension of Bonds

Clark V. Wood, president of the Worcester (Mass.) Consolidated Street Railway, has requested the holders of the $500,000 Worcester & Southbridge Street Railway 4½ per cent mortgage bonds to consent to a five-year extension of maturity at 7 per cent per annum. The bonds are dated Sept. 1, 1902, and were due on Sept 1 last.

In his letter to the holders Mr. Wood says that these bonds now the legal obligation of the Worcester Consolidated Street Railway are also secured by a first mortgage on all the Worcester & Southbridge property under which there are outstanding, in addition to these $500,000 of bonds, only an issue of $200,000 due June 1, 1925.

The management in consultation with some of the largest holders of these bonds believes that in view of the recent difficult railway situation in Massachusetts resulting from increases in operating costs the time is not advantageous for such general refunding of the company's funded debt as it hopes in the near future to effect.

The Worcester Consolidated Street Railway had a clear dividend record for more than thirty years prior to 1918. Its annual reports show that from 1895 up to 1918 it had never paid less than 5 per cent per annum. During this year the company has resumed the payment of dividends upon its preferred stock.

The proposed extension has been approved by the Massachusetts Department of Public Utilities.

Transit Hearings Nearing Completion

The hearings before the New York Transit Commission on the statutory plan under which it is proposed that the city of New York take over the transit lines wholly within its borders have practically been completed and accountants for the commission are at work upon the commission's final offer to the companies and the plan that will be placed formally before the Board of Estimate for approval.

Toronto Interest Payment Arranged

The directors of the Toronto (Ont.) Railway announced on Aug. 26 that six months' interest on the bonds of the company would be paid on Aug. 31, 1922, at the rate of 6 per cent. A statement to bondholders by J. C. Grace, secretary and treasurer, said that interest will be paid by check upon presentation of the bonds at the Canadian Bank of Commerce, Toronto, the agency of the Canadian Bank of Commerce, New York, or at the Bank of Scotland, London, England. The principal of the bonds matured on Aug. 31.

Mr. Grace explained further that the arbitration with the city of Toronto to fix the price for the company's railway property taken over by the city was practically completed. The arbitration board will reconvene on Sept. 19, he said, and it was hoped the award will be announced during November. Mr. Grace said:

> The negotiations for the sale of the company's power, electric light and radial railway interests—other than the Toronto Railway—to the Hydro-Electric Power Commission of Ontario have been completed. The purchase consideration in bonds of the city of Toronto and of the Hydro-Electric Power Commission will be delivered to this company during October. As soon as possible thereafter steps will be taken to realize on these securities and to discharge the obligation of this company on its bonds.

The executive added that with the payment of interest due Aug. 31, 1922, the company had hoped to pay its matured bonds, but unavoidable delays made it necessary to ask bondholders for a "further indulgence of possibly three months."

Washington Merger Bill Passed by Senate

The Senate on Sept. 1 passed a bill to permit the merging of the Washington Railway & Electric Company and the Potomac Electric Power Company. The measure also provides that the railways operating wholly or partially within the District of Columbia may merge one with the other. That provision of the bill applies directly to the Capital Traction Company, the East Washington Heights Traction Railroad, the Washington & Maryland Railway, the Washington & Virginia Railway, the Washington & Old Dominion Railway, the Washington Railway & Electric Company, the Georgetown & Tennallytown Company, the Washington Interurban Railroad, the City & Suburban Railway of Washington and the Washington & Rockville Railway.

This legislation will be strongly opposed in the District of Columbia committee of the House of Representatives, because it would permit a merger of the Washington Railway & Electric Company with the Potomac Electric Power Company without compelling a merger of the consolidated corporations with the Capital Traction Company. The Senate committee's position, however, is that this merger is a prerequisite step toward bringing about the merger of the street railways in the capital. As this is written there is some talk of reconsidering the vote in the Senate.

Since the opposition in the House will have support, it is believed, from the Public Utilities Commission of the District and from the Capital Traction Company, the chances are against the final passage of the measure.

Will Sell Line at Auction

The complete property and equipment of the Manhattan City & Interurban Railway, Manhattan, Kan., with the exception of the four-wheel drive trucks now in operation on the company's lines, will be sold at public auction on Sept. 27. The order, coming from the United States District Court, states that no bid of less than $70,000 shall be received or considered.

It is thought that the Manhattan Gas & Electric Company may offer to take over the line and re-electrify it. The company recently went into bankruptcy. J. T. West, Manhattan, and W. A. Busch, St. Louis, are receivers for the company.

Revenue and Traffic Decrease

According to its comparative statement of earnings the Utah Light & Traction Company, Salt Lake City, Utah, finished the year 1921 with a deficit of $3,112, against a surplus in 1920 of $12,800. Gross earnings in 1921 were $2,048,978, and $2,069,482 in 1920. Operating expenses including taxes increased from $1,489.283 in 1920 to $1,595,291 in 1921. Traffic statistics show that there was a decrease in the number of passengers carried, 40,512,223 being the number in 1920 and 36,671,610 the number in 1921.

Financial News Notes

Change in Name Ordered.—A resolution has been adopted by the City Council of Seattle, Wash., ordering the Ballard Beach carline renamed the Sunset Heights Line.

Interests Sold.—H. C. Smither and Warren Smither, owners of the controlling stock of the Salina (Kan.) Street Railway, have sold their interests to J. J. Wiesendanger, Randolph, Kan.

Gold Notes Called.—The American Light & Traction Company, New York, N. Y., will redeem on Nov. 1 next $3,000,000 principal amount of its $6,000,000 five-year 6 per cent gold notes issued under date of May 1, 1920.

Deficit Decreased.—The net corporate deficit of the New York Railways for June, 1922, was $184,378 against a deficit for the same month a year ago of $202,625. Operating expenses totaled $694,401, a decrease of $53,016 over June, 1921.

$2,134,000 of Bonds Offered.—Harris, Forbes & Company, Boston, Mass., are offering $2,134,000 of the Springfield (Mass.) Street Railway's refunding and general mortgage 20-year 6 per cent gold bonds. The bonds are dated Sept. 1, 1920, and are due Sept. 1, 1940. The price is 96½ and accrued interest yielding more than 6.30 per cent.

Municipal Operation May Be Next Step.—It is reported that as a result of the suspension of service by the Aberdeen (S. D.) Railroad the city may take over the property and operate it. Certain legal requirements prevented any action by the City Commissioners, but business men predict that difficulties will be overcome and that the city will assume control of the lines in the near future.

Receivership Hearing Again Postponed.—Frank Hedley, president of the Interborough Rapid Transit Company, New York, N. Y., has announced that, with the approval of Judge Mayer, the hearing on the motion for a receivership had been adjourned to Sept. 12, with the expectation that by that date sufficient deposits of securities would be made to warrant the final adoption of the plan of readjustment.

Surplus for 1921 Reported.—The operation of the Alabama Traction, Light & Power Company, which controls the Alabama Power Company, for the year ended Dec. 31, 1921, resulted in a surplus of $221,426 against $241,444 for the previous year. The operating revenue increased $366,686 over the 1920 amount. The operating expenses, however, including taxes increased from $2,160,248 in 1920 to $2,268,884 in the year 1921.

Name Changed—Stock Increased.—An amendment to the charter of the Knoxville Railway & Light Company, Knoxville, Tenn., changing the name of the corporation to the Knoxville Power & Light Company, was filed recently with Secretary of State Ernest N. Haston. The amendment increases the capital stock of the company from $2,050,000 to $10,000,000.

Applies for Refunding Issue.—Claiming that it could not meet the issue of bonds due on July 1 and in order to accept an offer of the North American Company to underwrite an extension of time the United Railways St. Louis, Mo., recently applied to the Public Service Commission to authorize a bond issue of $1,640,000 for refunding. The North American Company has consented to underwrite an extension to Oct. 1, 1923.

Gold Notes To Be Retired.—Seven per cent gold notes of the Detroit (Mich.) United Railway due April 1 next, will be retired at 100½ and interest at date on Oct. 2, and $500,000 due Sept. 1, will be retired immediately. The notes are part of $4,000,000 issued last year, of which $2,000,000 was retired on June 5. This leaves $1,000,000 outstanding. The company has retired a total of $4,400,000 of bonds and note issues in the past year.

Buys Interest in South Bend Property.—Controlling interest in the Indiana & Michigan Electric Company of South Bend, Ind., has been sold by Homer C. Henry, K. Chapin and Lowell Chapin, of Chicago, to the American Gas & Electric Company. The sale figure is reported to be close to $10,000,000. Recently the Indiana & Michigan acquired the Benton Harbor & St. Joe Railroad & Light Company and now operates in South Bend, and smaller communities.

Reports on Year's Operation.—For the year ended June 30, 1922, the Louisville (Ky.) Railway reports earnings from operation amounting to $4,600,871 against $4,300,373. Operating expenses decreased from $3,370,601 to $3,175,100 for the year ended June of this year. The balance available for dividends was $567,362 for the year ended June, 1922, against $31,632 for the year ending June 30, 1921. The amount short of common dividend requirements in the 1922 period was $107,054 against $642,784 for the previous year.

Net Income of $1,310,949.—For the seven months ended July 31, 1922, the Philadelphia (Pa.) Rapid Transit Company reports a net income of $1,310,949, against $1,007,372 for the same period a year ago. The passenger revenue for the seven months amounted to $23,987,217 a decrease of $368,671 over the seven months period of 1921. The total passengers carried from January-July, 1922, were 487,908,602, against 490,844,102 for the same period in 1921.

Surplus Earnings Increase.—For the twelve months ended July 31, 1922, the United Light & Railways Company and subsidiary companies, Grand Rapids, Mich., report gross earnings from all sources of $11,303,088, against $11,930,751 for the twelve months ended July 31, 1921. The surplus earnings available for depreciation, debt discount and common stock dividends for the 1922 period were $942,438, against $761,085 for the twelve months ended July 31 of last year.

Stockholders Approve Preferred Stock Issue. — Stockholders of the Georgia Railway & Power Company, Atlanta, Ga., have voted favorably on the plan to increase the first preferred stock of the company by $500,000 through the issuance of $2,500,000 of 8 per cent new stock to retire the present $2,000,000 of outstanding first preferred stock. The Georgia Public Service Commission will be asked to ratify the action. At the same time it will be necessary for the company to amend its charter by-laws to permit the increase in the stock of the company and the increase in the interest rate.

Proceedings on Increased Stock Going On.—The Nova Scotia Public Utilities Commission is in open session at Halifax over the dispute on the valuation of the physical assets of the Halifax Tramways. The proceedings are on the company's request to increase its capital stock. This is opposed by the city. W. H. Covert, Halifax, represents the Halifax Tramways and with him is associated, L. A. Tucker, Boston. Deputy Attorney General Mathers of the province of Nova Scotia represents the commission in examination of witnesses. E. P. Allison, Halifax, represents the city of Halifax.

Service Suspended.—Electric railway service has been abandoned in Ardmore, Okla., by the Ardmore Railway because it was never a paying proposition. For some months now only a single one-man car has been operating, but the order to pave C Street Northwest, part of the burden of which would have fallen to the railway, forced the owners to suspend operation. The equipment has been purchased by John Ringling, millionaire showman and rail magnate, according to T. E. Smelson, receiver for the company. The franchise has been retained and was included, it is said, in the deal.

Further Sale Negotiations Promised.—J. J. Bodell of Bodell & Company, Providence, R. I., representing the security holders of the New Brunswick Power Company, St. John, N. B., has offered to confer with the representatives of the city in a further effort to sell the railway and other property of the company to the city. The proposal urged by Mayor McLellan, recently elected, to have the city buy the property for $4,900,000 was defeated by the Council by a vote of four to one, the Mayor being the only Council member to support the plan. The Mayor said he believed Mr. Bodell, had offered the property to the city at the lowest price he had been commissioned to name without referring the matter back to his constituents. At the present time the papers that were circulated urging Mr. McLellan's recall are being withdrawn. The recall election will likely be set for some time early in October.

Traffic and Transportation

Lower Fares in Hollywood

Decision by California Railroad Commission Reduces Rate to Eight Cents on Commutation Basis

Fares have been ordered reduced in Hollywood. This is the decision of the California Railroad Commission. The reduction is from 10 cents to 8 cents on a 60-ride commutation book over the Pacific Electric Railway. This book must be used within forty days from the date of its purchase.

These are the outstanding facts of a decision just rendered by the commission, but the fare issue in Hollywood, in which the ruling just made is the latest official step, really dates back in its most significant move to Jan. 1, 1922. On that date the commission granted an increase in local and interurban fares. The 6-cent fare between Los Angeles and Hollywood district, which is within the city limits of Los Angeles, was increased to 10 cents and two zones created. Other sections of the City of Los Angeles as served by the Pacific Electric local street car lines were also zoned and a 10-cent fare established by order of the commission.

The Hollywood Board of Trade, City of South Pasadena and the Rose Hill District of the City of Los Angeles protested the fares and asked for a rehearing of the case. The rehearing was held during February and continued in March. The recent ruling is the result of the rehearing.

One Management Needed in Los Angeles

Rose Hill residents were awarded a fare reduction from 10 to 6 cents through the action of the commission in extending the limits of the inner zone on the company's Sierra Vista Line from its present terminus at Indian Village to Rose Hill Park. A satisfactory solution of Los Angeles' street car problems cannot be brought about until the two local systems, Los Angeles Railway Lines and Pacific Electric Local Lines, are joined under one management, the commission stated. Three methods were set forth by which this can be accomplished. They are: The Pacific Electric Lines shall take over the Los Angeles Railway Corporation's Lines or the Los Angeles Railway take over the Pacific Electric Local Lines, or the city of Los Angeles shall take over both of the local lines of the two systems under municipal ownership.

South Pasadena car riders were also included in the fare reduction to 8 cents through zones, which now enables commuters on this line to ride as far as Mission Road and Fair Oaks Avenue, which was formerly outside the limits of the outer 10-cent zone.

The complaint of the Hollywood Board of Trade to extend the lines of the Los Angeles Railway into Hollywood as exclusively served by the Pacific Electric local lines was dismissed by the commission on the ground that the jurisdictional issues involved must first be made the subject of a test case in the State Supreme Court.

Under the reduction in fares to the Hollywood District the commutation books will have sixty rides and will be good for forty days without limitation as to use in that period and sell for $4.80.

In discussing the Los Angeles situation the commission declared that unification of the two separately-owned systems in the city of Los Angeles is essential to meet the city's transportation needs, and unless one of the companies takes over the lines of the other, municipal ownership is pointed to as the only alternative solution.

Commutation Book Desirable

In regard to the interzone coupon fare, the commission said:

> With the results of operations on the Los Angeles local service of the Pacific Electric Lines before us for the first five months of 1922, we conclude that a modification of the inter-zone rate is justified and that the benefit of a lower fare may be given to the regular rider analogous to the reduced commutation fares in the interurban service.
>
> We believe it is practicable and desirable to establish a form of monthly commutation 60-ride coupon ticket without limitation as to use, good for 40 days from date of sale and good for a ride through two zones and with transfer privilege, the same as 10-cent cash fare, and that this form of ticket can be sold by the Company for $4.80, a reduction of $1.20 below the same number of single cash fares and the equivalent of 8 cents for a ride through two zones. We believe that such a ticket will not only prove a great convenience and benefit to the regular car rider in the outlying districts, but that the loss in revenue to the company will be offset, partially at the least, by an increase in traffic.

The commission also announced that it would institute a proceeding to bring about a universal transfer system in Los Angeles. The Pacific Electric Railway, as a condition in the present case, has consented to such a system. Referring to the additional equipment for the Hollywood service and the completion of the Hollywood subway, involving an expenditure of $3,000,000 and made conditions of the original decision, the commission said that there appeared to be no reason now, as soon as the necessary city franchises were granted, for any further delay in the consummation of the requirements referred to, and that the company would be expected to use all possible diligence in completing the Hollywood construction and service program in the matter of the tunnel and equipment, as well as in the matter of motor bus feeder lines.

Discussing the complaint of discrimination in different service and different rates on two street car systems serving the same city, the commission suggests a conference of the city, commission and the railways to consider unification.

After comparing the estimated return to the company, allowed in the original decision of Jan. 1, 1922, with the operating results for five months, the commission declared there was no justification for any change in the general rate structure of the Pacific Electric Lines, except the modifications made in the present order on rehearing. It is pointed out that the Pacific Electric Lines have not earned the estimated 5 to 5½ per cent, after making up deferred maintenance, and the commission concludes:

> We see no possibility of the company's being able to earn an excessive return. The adjustments required in this decision in local fares and in the zone arrangements will tend to reduce operating revenues and the recent reduction by the Interstate Commerce Commission of freight rates has already had, in a large amount, a similar effect.

Pass Has Increased Riding, but Decreased Revenues

According to figures given out by R. T. Sullivan, manager of the Tacoma Railway & Power Company, Tacoma, Wash., traffic in Tacoma has increased 11.7 per cent in the past four weeks, since the weekly pass went into effect but revenues have decreased 11.5 per cent. Mr. Sullivan on this point said:

> We have had the pass only four weeks. It has decidedly stimulated the use of the street cars, however. From my personal information, I know of people who are using the street cars now who have not done so for years. So far as the final results are concerned, it is difficult to estimate, because we had not had a fair trial. With the beginning of the pass system, we were hit by seasonal jitney competition. We will have to have several more weeks' figures before we know the financial results.

The first week the pass was tried out, 7,007 passes were sold. There was no jitney competition. The next week, with competition, the company's record shows 8,380 passes sold, the third, 8,250 and the fourth week, 8,400 passes. With no jitneys in operation, the company's books show that the 7,000 passes sold the first week were used for 187,784 rides, an average of 3.59 cents per ride. The second week 225,120 people rode on the pass, at an average cost of 3.58 cents each. The third week, 230,625 rides were obtained by pass holders, at a cost of 3.57 cents each. The fourth week saw 233,290 rides, at a cost of 3.58 cents each.

According to combined estimates for jitney operators in the city, between 9,000 and 10,000 persons are being carried daily by the twenty-five buses now in operation, on a 5-cent fare basis.

The Tacoma company filed its application with the State Public Service Corporation to try out the pass system for four months. Mayor A. V. Fawcett, who imported the jitneys, did so with the understanding that they would continue to operate until Jan. 1, 1923. He was elected on a promise of a 5-cent fare, and for that reason put the jitneys on different routes.

Rehearing on Paving Decision to Be Granted.—A rehearing on the decision of the Public Service Commission that the Indianapolis (Ind.) Street Railway is not required to pave between its tracks and on either side will be granted on the petition of the corporation counsel for the city.

Service Discontinuances and Fare Changes Sought

The Wheeling (W. Va.) Public Service Company and City Railway Company jointly have asked Public Service Commission for authority to discontinue certain service, and the Wheeling Public Service Company by itself has formally applied for permission to change its fares. In the first-mentioned case the applicants want to discontinue certain service on the East Wheeling loop division of the City Railway Company. It is represented in the application that the East Wheeling loop division is unprofitable to operate and that the same territory is served by the Wheeling Public Service Company. The specific portions of the north and the south divisions are also said to be unprofitable and to be receiving service from the Wheeling Traction Company.

The Wheeling Public Service Company proposes that it will serve East Wheeling territory at the same ticket rate and provide transfers to the City Railway Company. In the other application the Wheeling Public Service Company asks permission to sell four street car tickets for 25 cents for travel between Twelfth and Chapline and McCullough and Tenth Streets. The present single cash fare is 10 cents.

Puget Sound Company Orders Eight Buses

Eight motor buses have been purchased by the Puget Sound International Railway & Power Company for use in Everett, Wash. They will be the first unit of a fleet of buses which will be operated by the railway company in motorization of the city. The order was placed with the Fageol Company, Oakland, Calif., and provides for a shipment every fifteen days, beginning Oct. 14 and ending Dec. 1. A garage, 132x60 ft., with capacity of twenty-four cars, is now under construction. A machine shop for repair work will be maintained in conjunction with the garage.

A rival transportation company, John W. Hartman & Company, is now seeking a renewal of its franchise from Dec. 31, giving it permission to operate buses over certain streets. The railway by its amended franchise may operate a line parallel to that of the Hartman company, and maintains that it should be allowed a chance to develop its bus system, without a rival company operating in the city. The decision on the Hartman franchise will be held in abeyance until Dec. 25.

You Must Move Quickly in Dallas

The Dallas (Tex.) Railway is starting a campaign to speed up service on its lines. Upon approval of the Dallas Safety Council, the City of Dallas has authorized double-deck loading at all the principal downtown corners, and safety zones have been marked and traffic signal posts placed so as to allow two street cars to take on and discharge passengers at one corner at the same time. The safety zones have been extended the full length of two street cars.

In an effort to afford additional relief, George I. Plummer, superintendent of traffic of the Dallas Railway, has caused signs to be placed in all street cars asking passengers to move briskly and proceed promptly in boarding or leaving street cars. Extra men are being placed by the traction company at street intersections where boarding is heaviest during the rush hours, and boarding at both front and rear entrance is being permitted. The railway employees on the ground are equipped with portable fare boxes, and patrons are permitted to pay their fares and board cars from the front entrance as well as rear entrance.

Transportation News Notes

Hearing Scheduled.—A hearing in the matter of interchangeable mileage tickets will be held before the Interstate Commerce Commission in Washington on Sept. 26. Charles L. Henry expects to appear on behalf of the American Electric Railway Association.

Another Weekly Pass Plan.—The Pacific Power & Light Company, Astoria, Ore., has been granted permission by the Public Service Commission to put into effect the weekly dollar pass. The present fare is 7 cents, with books of fifty rides purchasable at $3, or 6 cents per ride.

May Extend One-Man Car Service.—Although no decision has been reached, the Morris County Traction Company, Morristown, N. J., is considering the extension of its one-man car service by replacing the larger type of car. The company has about twenty of the larger type cars in use. One-man cars are in operation on several local lines.

Orders Resumption of Rush Hour Service.—The Transit Commission has ordered the Interborough Rapid Transit Company, New York, N. Y., to resume rush hour service on all lines on Sept. 6. Reduction of 10 per cent in service was permitted in the rush hour period a few days ago until the commission could investigate the steaming qualities of British coal.

Will Petition for Lower Fare.—The Evanstown (Ill.) Street Railway will petition the Illinois Commerce Commission and the City Council for permission to reduce fares. Patrons are now paying 7 cents cash fare with a 6-cent ticket rate. The company proposes to cut the price of the tickets to 5½ cents when sold in lots of less than eleven. According to the plan eleven tickets will be sold for 55 cents.

Commission Must Answer Charge.—Corporation Counsel John P. O'Brien obtained from Supreme Court Justice Edward J. McGoldrick a writ of certiorari requiring the Transit Commission to certify to the Supreme Court its reason for authorizing the New York, Westchester & Boston Railway to charge 7 cents instead of 5 cents on its lines within the city limits. This increase, the city holds, was a violation of the Public Service law and contrary to the terms of the agreement made between the city and the company Aug. 2, 1904, when the railway obtained permission to use certain thoroughfares.

Collects a Seven-Cent Fare. — The Louisville (Ky.) Railway is collecting a 7-cent fare, as the recently passed ordinance, calling for a 6-cent ticket fare, and a 7-cent cash fare, doesn't become effective until the stockholders of the company meet and approve it. It will probably be Sept. 18 before the new rate becomes effective. Incidentally the company will not have to rebate any 7-cent fares collected during the period of approximately nineteen months, while the increase from 5 cents was in litigation.

Fare Case Before Master.—The case of the city of Fort Worth against the Northern Texas Traction Company over the matter of a reduced fare has been before Master in Chancery N. A. Dodge. The city is represented by Corporation Counsel Rinehart Rouer, Gillis Johnson and Raymond Buck with S. B. Cantey, Sr., and W. R. Tucker, Boston, as traction attorneys. The expert witnesses for the city are Joseph M. McShane for the traction company, H. P. Gillette of Chicago, editor of *Engineering and Contracting* and a well known cost expert. The case has not yet been decided.

Five-Cent Fare for Trial Period.—Announcement has been made by the Lafayette (Ind.) Street Railway that a 5-cent fare will be put into effect immediately. The present fare is 7 cents. Under its franchise, granted by the city and approved by the Public Service Commission, the company is authorized to charge 5 cents with 2 cents for transfers. However, the 2-cent transfer charge will not be made. The 5-cent fare will be tried six months. Recently the system was sold at a receiver's sale in Federal court and purchased by Lafayette capitalists. Improvements costing $250,000 have since been made.

Protests Bus Application.—The Rainier Valley Railway, Seattle, Wash., has entered strong protest with the public utility committee against the granting of the application of C. E. White for a jitney permit to operate over Rainier Avenue from Rainier Beach to Fourth Avenue and Stewart Street, on the ground that the competition would reduce revenues to such an extent that its present service could not be maintained. The railway submitted a proposition to operate a bus from Rainier Beach to the top of the hill, a route of about 1 mile, in conjunction with its railway and submitted a petition signed by approximately 5,000 residents.

New Publications

1921 Engineering Index

Published by the American Society of Mechanical Engineers, 29 West 39th Street, New York City.

This is the third volume of the Engineering Index to be published under the auspices of the A.S.M.E., which is endeavoring to make it as complete and accurate as the resources of the society permit. The 584 pages of the index proper contain over 14,000 items referring to articles in some 600 engineering and allied technical publications. In selecting the items, the engineering staff of the society has reviewed the 1,200-odd periodicals, reports and other publications regularly received during the year by the Engineering Societies Library.

This bound volume contains the accumulated references which appear month by month in *Mechanical Engineering*, the official publication of the A.S.M.E.

Naturally the Engineering Index contains a very large number of references to articles of interest to electric railway engineers in all departments because, while it is published by the Society of Mechanical Engineers, its field covers all phases of engineering.

Water Power Survey in the Netherlands East Indies, No. 2

A report published by the government hydro-electric service of the Netherlands East Indies, Bangdoeng, Java.

This supplements the report mentioned in the issue of this paper for Aug. 11, 1922.

Switching Equipment for Power Control

By Stephen Q. Hayes, Switchboard Project Engineer, Westinghouse Electric & Manufacturing Company. First edition. McGraw-Hill Book Company. 463 pages. Illustrated.

When one ponders over the title of Mr. Hayes' book he realizes what a task the author set for himself. However, as Mr. Hayes has been a practical specialist in this field for many years he has been able to make a good job of it. He states, and he ought to know, that his main object has been to furnish the actual switchboard operator the information that will enable him to keep the equipment in his care in the best operating condition, by explaining what should be expected of the apparatus and equipment, and further to assist him in selecting and installing new material.

The above explains the somewhat encyclopedic nature of the book, and also the scattering throughout the descriptions of practical hints which embody the author's own experience and observation.

It is a difficult thing for a man connected with one manufacturer to give appropriate treatment of the output of others in competing lines. Here, however, manufacturers' names other than Westinghouse are freely mentioned and examples of their products are given. Of course the author could not be expected to enthuse over the products of business rivals, but he states their features dispassionately as he does in the case of his own company.

Railroads and Government

By Frank Haigh Dixon, Ph. D. Charles Scribner's Sons, New York, 1922. 384 pages.

This is an account of the federal regulation of railroads in the United States from 1910 to the end of 1921. It will be admitted that this has been a critical period. The book is divided into three parts: Federal Regulations from 1910 to 1916, the War Period, and the Return to Private Operation. In a final chapter on the future, the author reaches briefly four conclusions: Private operation (which he recommends) requires a sufficient return to insure a constant stream of new capital in the industry, and this requires a return of at least 6 per cent on the investment. If this rate cannot be earned, government aid will have to be sought, and this means inevitably government ownership and probably government operation, though the former would be hazardous and the latter disastrous. Under existing conditions it is doubtful if 6 per cent can be earned continuously, and higher rates are inadvisable. Hence the increase must come through savings in operating expense. These savings cannot be obtained by minor economies frequently suggested, but must come through a program of efficient and economical operation on a national scale.

These suggestions are particularly pertinent in view of the present strike. The author declares that in such an essential industry as railroading both capital and labor should be required to accept service subject to a limitation upon their freedom of action in the settlement of their disputes.

New Overhead Crossing Specifications for Ohio

Rules, regulations and specifications for situations where electric lines cross or more or less parallel the line of a railroad, interurban railway, or other public utility. Published by the General Committee of Railroads and Public Utilities Operating in the State of Ohio. Distributed by the Ohio Committee on Public Utility Information, Illuminating Building, Cleveland, Ohio.

This complete treatise of 275 pages has been prepared for the Public Utilities Commission of Ohio by a large committee representative of the railroads and utilities, together with an eminent corps of advisers. The committee chairman is W. T. Teague, general superintendent of plant the Ohio Bell Telephone Company, and the secretary, H. W. Hough, research engineer the Cleveland Electric Illuminating Company. The code was prepared in pursuance of an act of the General Assembly, approved on June 7, 1921, revising the appropriate sections of the general code relating to wire line construction, maintenance and operation.

This new code goes into every detail of crossing construction and contains numerous tables of data and charts to enable crossings to be constructed without any possible misunderstanding as to what the intent of the rules is. The text goes so far as to give a complete example of crossing calculations, covering thirty-two pages and a folding plate.

No detailed analysis of the contents can be given here, but engineers and others interested can obtain copies at a nominal price through the committee mentioned. This code is of course in more detail than the National Electrical Safety Code, the corresponding part of which is under revision. It is also more elaborate than the Pennsylvania code, and has the advantage of having been prepared several years later.

Economics of Electrical Distribution

By P. O. Reyneau, Philadelphia Electric Company, and H. P. Seelye, Detroit Edison Company. First edition. McGraw-Hill Book Company. 209 pages. Illustrated.

While this book is primarily for the central station engineer, it can be useful also to electric railway power distribution men in a number of ways. In the first place it will stimulate them to look at their problems with an analytical rather than an empirical eye. Again, whether or not electric railway engineers find it necessary to follow the authors in all of the details of their reasoning, the arguments will be useful and excellent reference use can be made of the formulas, data and graphs which are liberally supplied.

Referring to the analysis mentioned above, it should be said that the authors do not claim overmuch for their theory, but they do try to lay a scientific foundation for the intelligent selection of such details as sizes of wire, types of insulators and the dozens of others which go into the making of a line. Of course all of this, as the title indicates, is with regard to costs.

The authors of this book are practical men in the sense that while they had excellent theoretical training they have been and are in daily contact with such situations as they cite in their illustrations. They naturally thus try to combine theory and practice in their treatment.

Giant We-the-People and Judge Landis' Award

By Henry K. Holsman and Ralph Parlette. Parlette-Padget Company, Chicago. 45 pages.

This booklet points out the foolishness and waste of contests between capital and labor. To illustrate this point the authors have used one of Aesop's fables and refer at length to Judge Landis' award in the building trades labor troubles in Chicago.

Personal Mention

The Wizard of Oshkosh

B. W. Arnold's Over-the-Top Tactics Extended to Several More Wisconsin Properties—Tenacious Manager of Railways Melts Opposition and Comes Up Smiling

Every one at the recent meeting of Wisconsin railway men knows that it was Bert Arnold who put across in magnificent shape the first separate convention of traction men in the State. In selecting Bert Arnold to prove that the railway men should convene as a separate unit the association made a wise appointment. However, it must be admitted that the Eastern Wisconsin Electric Company also recognizes executive ability, for the scope of Mr. Arnold's jurisdiction has recently been widened. He is now in charge of all the railway properties of the company. To the city property at Oshkosh and the interurban line between Neenah and Oshkosh, initially under his control, have been added the local lines at Fond du Lac and Sheboygan.

Why Bert Arnold was the logical successor to Harry R. Ellis, who recently became associated directly with Kelsey, Brewer & Company, is easy to understand. The Wisconsin men will recall that Bert made three points in his brief opening remarks. These were service, good public relations and economical operation. If he were not giving good service in Oshkosh, if he had not established almost ideal relations with the public of Oshkosh and if he were not producing transportation cheaply, he never would have recommended these ideas to others.

Wins Support

No citizen in Oshkosh is more firmly established as a force in the community than is Bert Arnold. He is not the Mayor or even a member of the City Council, but he does know everybody in town, from the editor of the local newspaper to the men who used to parallel his interurban with buses. The bus men don't duplicate Mr. Arnold's service any more because the City Council wouldn't let them, but Bert fixed the bus owners up with another route where there wasn't any other service. He invited them to use the railway stations for terminals and helps them settle their claims when they get in trouble.

When it came to getting the support of the local newspaper Bert Arnold was the forerunner of the present kindly co-operation that all Wisconsin utilities are receiving. When Bert first went to Oshkosh about five years ago no more bitter and sustained attacks nor sincere condemnation could be directed against any railway than was hurled at the local transportation system in that city by Col. John Hicks, a former United States Ambassador to Chile. His medium was the Oshkosh *Northwestern*. But Bert Arnold resolved immediately that this censure and ruinous criticism must cease and made repeated attempts to interview the gentleman, who invariably was "busy" writing an editorial and who so far as the electric company was concerned apparently had brought "Chile" with him from South America and set it down in Oshkosh. A showdown had to come and it arrived precipitately when the local manager omitted the customary formality of sending in his card, opened the door to the forbidden sanctum and thrust in his head. The editor snapped from his work and roared "Close that door!" The retort came back, "Yes, sir, just as soon as I'm in." From that day to this Bert's property has not been hounded with scathing editorials or colored news. This has held true even though Colonel Hicks died several years ago. Bert claims that all he demanded was a square deal and that the sins of former management be not held against him. If he fell down on the job the Colonel could renew his attacks. Bert never has, though!

It is doubtful whether many who saw the smiling face of the chairman at the recent Wisconsin meeting have heard that the manager at Oshkosh passed through more winter last year than Mark Sabre did in twenty. Bert's property was the victim of hell, high water and sleet, though in the reverse order. It was the most severe sleet storm ever experienced in that locality that laid low early this year nearly every overhead line and pole on the system. And then spring was so far behind that when it did come, it came all at once, with the result that a considerable portion of the roadway was inundated. As if it were not time for Bert's tribulations to cease, a fire visited and wiped out his carhouse, including a number of cars. But all's well in Oshkosh now. Safety cars glide up and down the streets and Bert is buying some new interurbans.

Started Railway Work in 1899

As mentioned before, Mr. Arnold is in charge of all the railway properties of the Eastern Wisconsin Electric Company. M. H. Frank, formerly local manager at Fond du Lac of both the city railway and the power department, will now manage the power business only in Sheboygan and Fond du Lac. A. Kolste will be the superintendent of railways in Sheboygan, reporting to Mr. Arnold, who will continue his headquarters in Oshkosh. Formerly all the local managers reported to Mr. Ellis in Sheboygan, who was vice-president and general manager of the company.

Mr. Arnold has been in railway work since 1899, when he entered the services of the Wheeling & Lake Erie Railway. He was dispatcher of the Lake Shore Electric Railway, Cleveland, Ohio, and chief dispatcher of the Muncie, Hartford & Fort Wayne Railway, Muncie, Ind. In 1907 he became superintendent of the southern division of the Illinois Traction System, McKinley Lines. From his headquarters at Springfield he was transferred to Decatur as superintendent of all lines entering that city, and later was made chief clerk to the general superintendent of the system. In 1910 he was made superintendent of transportation of the Chicago, Ottawa & Peoria Railway. In 1917 he was appointed manager of the Eastern Wisconsin Electric Company.

D. J. Bromley Carries On Electrification Project

D. J. Bromley, who has been associated with the Illinois Central Railroad for some time, has taken over the work of the late A. S. Baldwin, vice-president, in regard to the electrification of that line. This project, which includes electrification of the suburban lines and ultimately of the main lines and switching service, has been an important one for a number of years and has been developed to a point where a speedy and successful end is in sight. The decision as to the adoption of alternating or direct current depended largely on the inspection which Mr. Baldwin made just before his death, on June 27, of heavy traction electrification in continental countries.

E. R. Smith Chief of New Monongahela Department

To offer systematically for sale light, power and electrical appliances, the Monongahela Power & Railway Company, Fairmont, W. Va., whose power lines serve large territories in West Virginia and Ohio, has establishel a commercial department under the direction and management of Earl R. Smith. His offices will be in the Bethlehem Building in Fairmont.

Mr. Smith is to surround himself with assistants who are experts in the electrical business and his duties will be to offer the current of the company to domestic and manufacturing customers in the most modern and approved manner.

Mr. Smith is particularly well fitted for the head of the new and important department. He came to the company several years ago as purchasing agent and in this capacity had an opportunity to meet with and deal with the public. Later he became manager of the investment department, which kept him in contact with the public in Fairmont, Clarksburg and Parkersburg. Officials believe he will make the new department immediately successful.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Large Equipment Orders Recorded

Unprecedented Purchases of Cars in First Six Months Reflected in Orders for Motors—G. E. Alone Has Orders for More than 1,700 Equipments —Equipment Orders an Index to Better Times

The record of cars ordered is very largely the index to the prosperity of the electric railway industry. Thus the compilation in the *Electric Railway Journal* for July 1, 1922, showing 122 more cars purchased between Jan. 1 and June 15, this year, than were purchased during the entire year of 1921 meant the starting of a cycle of orders for equipment that has been a happy augury of better times ahead for a considerable period.

Reduced to concrete terms that augury is measured to the tune of 1,016 cars. Moreover, there can be no complaint about either the geographical distribution of the orders for cars or about their kind, for every section of the country is well represented among the companies that placed the orders and the types of equipment are represented by 443 safety cars, 107 special-type one-man cars, 404 other types of city cars, 12 interurban cars and 50 elevated cars.

Then, too, the figures of cars ordered are a partial index to the status of the different classes of roads, for while it has been generally acknowledged that the interurban railways were among the hardest hit during the war-time period, the fact that such roads are again coming into the market for equipment is an indication of their rejuvenation. This figure of 1,016 cars previously mentioned is just the record for the United States alone. As for foreign orders they, too, have been very large as the sales records of the car manufacturers testify.

These are the general facts. They have been stated before more elaborately, but they are of interest now for their more remote bearings. These cannot be pursued at this time in all their ramifications, but to one manufacturer, the General Electric Company, they have meant that since the first of the year it has received orders for 482 safety car equipments which were distributed among thirty-seven operating companies. During this same period orders have been received for approximately 600 four-motor equipments distributed among eighteen operating companies. The total number of orders for equipments for light-weight car equipments in city and suburban service since Jan. 1 has been approximately 1,100. Some of the larger orders received during this period have been:

81 safety car equipments for the Stone & Webster properties.
95 safety car equipments for the properties of the Illinois Traction System.
50 safety car equipments for the Louisville Railway.
25 safety car equipments for the United Electric Railways, Providence, R. I.
25 equipments for Richmond and a similar number for Norfolk.

Some of the larger orders for four-motor light-weight equipments are:

200 for Detroit Municipal Railway.
100 for the Boston Elevated Railway.
150 for the United Electric Railways, Providence, R. I.
30 equipments for the City Railway, Dayton, Ohio.
20 equipments for the Georgia Railway & Power Company, Atlanta, Ga.

Two very important equipment contracts closed so far this year by the company were those for 114 equipments for the Chicago Surface Lines and 200 equipments for the Department of Street Railways in the city of Detroit.

The Chicago Surface Lines order has been referred to previously in the *Electric Railway Journal*. It is, however, particularly interesting as the same motor equipment was selected for two types of cars. Forty-five two-motor car equipments were purchased for use on double-truck, one-man cars, and sixty-nine four-motor car equipments for a larger motor car to handle a trail car. Air compressors and controllers, the latter to be furnished with aluminum castings, are included. This is the first installation of two-motor equipments on light-weight double-truck one-man cars. The car on which these equipments will be used was designed by H. H. Adams, superintendent of rolling stock and shops of the Chicago Surface Lines. It incorporates some new features in the operation of cars of this type.

The adoption of 28-in. wheels for both the four-motor and two-motor equipments enabled the Chicago railway to standardize the same motor wheels and axles for both types of cars. The G. E. 275 motor selected for this equipment is the one recently placed in manufacture by the General Electric Company for use on low-wheel trucks in heavy city and suburban service.

The largest single order for cars placed in the last few months was the one recently awarded by the city of Detroit for 200 light-weight city cars. The General Electric Company received the order for the electrical equipment, which will include a four-motor car equipment with K-35 control and CP-27 air compressor. The cars and electrical equipment are duplicates of fifty cars which have been in successful operation for more than one year. The G-E 265 motor selected for these cars is one which was placed on the market by the General Electric Company about two years ago.

These, in brief, are the important facts with respect to the cars and their motor equipment. There is more to the mere record of orders than this, however. As a matter of fact, the adoption of the light-weight equipment in Chicago and Detroit is interpreted as reflecting a growing use of the light-weight cars for both city and suburban service. Therein is the moral pointed for the future.

Spanish Railway Officials Inspect Westinghouse Plant

Senor Don José Moreno Ossorio, general manager of the Norte Railway in Spain, and several other Spanish railway experts who are working out plans for the proposed electrification of the Norte Railway recently made a tour of inspection through the East Pittsburgh Works of the Westinghouse Electric & Manufacturing Company.

The other members of the inspection party were Don Mario Viani Caballero, chief engineer of the motive power department, Norte Railway; Prof. Don José A. Perez Del Pulgar, professor of electrical engineering, Instituto Catolico de Artes e Industrias, and R. F. Hamilton, consulting engineer of the Sociedad Espanola de Construccion Naval, which represents the Westinghouse Electric International Company in Spain.

The initial electrification on the Norte system, which is one of the largest in Spain, will include about 40 miles of line running from Ujo through the mountainous Pajares section in the north. Three thousand volts direct current will be used in this section, and water power will be purchased from the Electra de Viesco Company in Asturias. More extensive electrification is planned for the future on the Madrid-Venta De Banos section of the railroad.

$158,000 on Track Construction Planned

On its Utica division which takes in the cities of Utica and Rome the New York State Railways plans on spending $158,500 on track construction work alone during the present year. The engineer's estimate for the Utica track laying jobs aggregates $96,000 for new rails on Columbia and Bleecker Street lines. In Rome $38,000 is being expended for new rails on West Dominick Street. All of the rails used in the construction work were purchased from the Lorain Steel Company. Three loops are to be built at the terminus of the North Utica, Blandina Street and Lincoln Avenue lines. The Lorain Steel Company submitted the low bid of $2,046 for the loop to be placed at the end of the Blandina Street line and the Buda Company was awarded the North Utica loop with its bid of $1,820. The contract for the other loop has not been placed. It will cost about $24,000 to install the loops.

Temporary Halt in Upward Coal Prices

Rapidly mounting production from the bituminous coal mines, as district after district has returned to work, has eased the market and put a soft pedal on high prices. *Coal Age* Index of spot prices of soft coal at the mines dropped 17 points this week, to 420 from 437 a week ago. The high point so far this year was reached the last week of July and since then the decline has been consistent, though unsteady. The average price on Tuesday of this week was $5.08, compared with $6.73 on July 31, the peak. In the West, prices now average under $5 and in the East from that figure up.

Prices are irregular and doubtless will continue so until the extent of the expected car shortage is fully developed. The big questions are: To what extent will the soft-coal mines be called on to replace normal anthracite requirements, and at what figure will bituminous coal output be halted by car shortage and transportation disability?

It is the present expectation that prices will decline even more for several weeks and then with cold weather and the full pressure of winter demand, plus the necessity for winter storage, to start up, slowly at first and then rapidly. What will happen then, it is predicted, will depend on the legislation passed by Congress. If that proves to be effective, provided it is passed, prices may be held in check; otherwise another ascension.

Production last week is estimated at a little short of 10,000,000 net tons, all soft coal. The gains each week are now from the union fields that were on strike, and of course nearest to markets that were shortest of coal.

Metal, Coal and Material Prices

Metals—New York	Sept. 5, 1922
Copper, electrolytic, cents per lb.	14.00
Copper wire base, cents per lb.	15.75
Lead, cents per lb.	5.90
Zinc, cents per lb.	6.60
Tin, Straits, cents per lb.	32.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$9.00
Somerset mine run, Boston, net tons	5.25
Pittsburgh mine run, Pittsburgh, net tons	......
Franklin, Ill., screenings, Chicago, net tons	4.25
Central, Ill., screenings, Chicago, net tons	4.325
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., cents per lb.	6.25
Weatherproof wire base, N.Y., cents per lb.	15.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N.Y., cents per gal.	91.50
White lead, (100-lb. keg), N.Y., cents per lb.	12.50
Turpentine, (bbl. lots), N.Y., per gal.	$1.23

Rolling Stock

Lincoln (Neb.) Traction Company has converted more than 95 per cent of its cars for one-man operation.

Metropolitan West Side Elevated Railway, Chicago, Ill., has purchased 140 Westinghouse 567-R-1 motors and 90 equipments of automatic battery line field control. These equipments will be used on the new cars being built by the Cincinnati Car Company for the Chicago line. The motors are duplicates of those now in service. The Westinghouse Automatic Battery Line Field Control, which will be a feature of the installation, is designed for multiple-unit operation with the G. E. type M control.

Dallas (Tex.) Railway has ordered five passenger and two express interurban cars from the American Car Company. These are to be lightweight cars built in accordance with designs and specifications supplied by the Texas Construction Company. They will be 45 ft. in length over all, 8 ft. 6 in. in width over all and have seats 37 in. wide and an aisle 27 in. wide. They will seat fifty-four passengers and are designed so that they may be operated by one man or two men. Wide aisles are a distinguishing feature of the passenger cars, permitting easy ingress and egress from either end. The seats will be upholstered in green plush, giving the cars a very attractive appearance. They are to be spaced 33 in. between centers, giving ample room. Grab handles and pipe stanchions are to be of white enamel. The rear vestibule is to be built with long windows and a low dash, affording an observation platform on which five comfortable armchairs are to be placed.

Track and Roadway

New York, N. Y.—The Transit Commission has sent plans for a crosstown Queens and Brooklyn subway to the Board of Estimate. The final cost is estimated at $68,000,000.

Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, has notified the city of Findlay that it will place new rails and ties between McManness and Carnahan Avenues.

Indianapolis (Ind.) Street Railway has been ordered by the Indianapolis board of public works to repair its tracks in Central Avenue between Nineteenth Street and Fall Creek.

Norton, Taunton & Attleboro Street Railway, Norton, Mass., must rebuild its roadbed along South Main Street in Mansfield. The expense to the company is limited to $1,000, the town to pay the remainder.

Kitchener, Ont., property owners have voted 421 to 62 to raise $70,000 to improve the street railway system by increased double trackage, construction of new carhouses and the purchase of three new cars.

New Brunswick Power Company, St. John, N. B., is laying 62-ft. rails on Prince William Street. These are more than double the length of the old rails. This will mean fewer joints and less damage to the new paving which is now being done on this thoroughfare.

The South Covington & Cincinnati Street Railway, Covington, Ky., will lay "T" rails instead of the grooved type on Thirty-fourth Street, Latonia, Ky. The substitution was made necessary by the railroad strike, as the traction company has been unable to obtain shipments of the heavier rails.

Power Houses, Shops and Buildings

Potomac Public Service Company, Hagerstown, Md., will install additional machinery at the power plant at Millville, W. Va.

Wheeling (W. Va.) Traction Company is installing an up-to-date freight station to handle freight in and out of Wheeling, at the corner of Main and Twenty-first Streets. Under the new arrangement freight will be received at the new station at any time during the day and way bills issued to any point on the Pan Handle and Moundsville Divisions. It will not be necessary to haul freight to this station at any particular time and there will be no congestion whatever.

Muskogee, Okla.—Construction has begun on the Oklahoma General Power Company's plant by the Byllesby Engineering & Management Corporation. The plant is on the Arkansas River, and will have an initial capacity of 10,000 hp. with a water consumption of 20,000,000 gallons daily. Transmission line connection will be made with the distribution systems of the Oklahoma Gas & Electric Company and the Fort Smith Light & Traction Company. The plant will be operated under a long-term lease by the Oklahoma Gas & Electric Company.

Trade Notes

National Carbon Company, Long Island City, has placed on the market a new electro-graphitic brush known as "259."

Hardwood Manufacturers' Institute, Chicago, Ill., has moved from the Memphis headquarters to offices at 1020 South Wabash Avenue, Chicago.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has become agent for the DeLaval transformer oil purifiers and dehydrators. This apparatus operates on the centrifugal principle and is designed to remove sludge from lubricating oil and to dehydrate and purify transformer and other insulating oils.

New Advertising Literature

Davis Boring Tool Company, St. Louis, Mo., has issued a leaflet describing the construction of its expansion reamers. Tables are given of the various dimensions, number of blades, etc.

Rail Welding & Bonding Company, Cleveland, Ohio, has published Bulletin No. 101, which fully describes RWB dynamotors, Type BB, for welding rail bonds, building up worn and cupped rails, repairing manganese special work and for general shop welding.

The Electric Furnace Company, Salem, Ohio, has issued circulars with illustrations showing some of the many types of electric enameling, annealing and heat-treating furnaces which it has installed in the last few years.

PEACOCK STAFFLESS BRAKES

Increase Safety Car Savings

Two sources of direct financial gain are traceable to the use of Peacock Brakes on safety cars. These little cars themselves, are designed to reduce operating and maintenance expenses. And Peacock Staffless Brakes contribute a material share toward these savings.

How? First by reducing the accident hazard, and thereby eliminating damage costs. The Peacock Staffless Brake is a most powerful and fast-working hand-brake, devised especially for safety car conditions. It is a dependable and a necessary piece of emergency equipment. The law generally requires a workable emergency hand brake, and sound common sense suggests applying nothing less than the best on the market.

The second source of actual savings is in the maintenance end. Peacock Staffless Brakes are so simple, yet ruggedly constructed, that maintenance costs are practically eliminated. They will function perfectly for years without repairs.

Peacock Staffless Brake equipment will more than pay for itself in savings.

Specify

Peacock Staffless for Safety Cars.

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative:

Lyman Tube & Supply Company, Limited, Montreal, Canada

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Business Established 1894
115 BROADWAY, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

WALTER JACKSON
Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

C. E. SMITH & CO.
Consulting Engineers
2065-75 Railway Exchange Bldg., St. Louis, Mo.
Chicago Kansas City
Investigations, Appraisals, Expert Testimony, Bridge and Structural Work, Electrification, Grade Crossing Elimination, Foundations, Power Plants

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells John F. Layng Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

JOHN A. BEELER
OPERATING, TRAFFIC AND RATE INVESTIGATIONS
SCHEDULES—CONSTRUCTION—VALUATIONS
OPERATION—MANAGEMENT
52 VANDERBILT AVE., NEW YORK

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

ROBERT M. FEUSTEL
CONSULTING ENGINEER
Rate, Traffic and Reorganization Investigations
Fort Wayne, Indiana

PETER WITT
UTILITY CONSULTANT
456 Leader-News Bldg., Cleveland, O.

Parsons, Klapp, Brinckerhoff & Douglas
WM. BARCLAY PARSONS H. M. BRINKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
CLEVELAND NEW YORK
1570 Hanna Bldg. 84 Pine St.

DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

AMERICAN BRIDGE COMPANY
EMPIRE BUILDING, 71 BROADWAY, NEW YORK

Manufacturers of Steel Structures of all classes, particularly
BRIDGES AND BUILDINGS

Sales Offices:

NEW YORK, N. Y. ....71 Broadway
Philadelphia, Pa. ....Widener Building
Boston, Mass. ....120 Franklin Street
Baltimore, Md. ....Continental Building
PITTSBURGH, PA. ....Frick Building
Buffalo, N. Y. ....Marine National Bank
Cincinnati, Ohio ....Union Trust Building
Atlanta, Ga. ....Candler Building
Cleveland, Ohio ....Guardian Building
Detroit, Mich. ....Beecher Ave. & M. C. R. R.
CHICAGO, ILL. ....208 South La Salle Street
St. Louis, Mo. ....Liberty Central Trust Bldg.
Denver, Colo. ....First National Bank Bldg.
Salt Lake City, Utah ....Walker Bank Building
Duluth, Minn. ....Wolvin Building
Minneapolis, Minn. ....7th Ave. & 2d St., S.E.

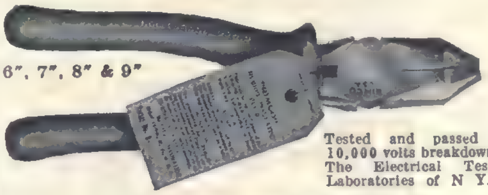
Pacific Coast Representative:
U. S. Steel Products Co., Pacific Coast Dept.
San Francisco, Cal. ....Rialto Building
Portland, Ore. ....Selling Building
Seattle, Wash. ....4th Ave. So., Cor. Conn. St.

Export Representative: United States Steel Products Co., 30 Church St., N. Y.

Byllesby
Engineering & Management
Corporation
208 S. La Salle Street, Chicago
New York Tacoma

SANGSTER & MATTHEWS
Consulting Accountants
Valuation and Rate Specialists
Depreciation Consolidations **Rate Schedules**
Reports to Bankers
25 Broadway, NEW YORK
134 South LaSalle Street, CHICAGO

"RIMCO" Insulated Pliers
"The only SAFE PLIERS for linemen and all high tension work"



6", 7", 8" & 9"

Semi-soft rubber insulation bounded to metal by *Elchemco* process.

Tested and passed for 10,000 volts breakdown by The Electrical Testing Laboratories of N. Y. C.

Insulation cannot crack or work loose

Rubber Insulated Metals Corporation
50 Church Street, New York City, U. S. A.
Distributed by The Electric Service Supplies Co., and other distributors
Export Distributor: International Western Electric Co.

KELLY, COOKE & COMPANY
Engineers
149 BROADWAY NEW YORK
424 CHESTNUT STREET PHILADELPHIA

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
Chicago Youngstown Dallas
Los Angeles Montreal Rio de Janeiro

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK
Street Railway Inspection DETECTIVES
131 State St. BOSTON

The Corporation Service Bureau
D. H. Boyle, President L. A. Christiansen, Vice President
A. R. McLean, General Manager
LABOR ADJUSTERS
Investigations—Inspections—Confessions
GENERAL OFFICES:
Suite 1215, Ulmer Building, Cleveland, Ohio

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

After the Showdown

The great "buyers' strike" of 1920-21, a never-to-be-forgotten event in the economic history of this country, proved a point which must henceforth be recognized as basic and incontrovertible.

It was discovered by merchants and jobbers everywhere, in practically every line of merchandise, that it was the trademarked and adequately advertised brands of goods that got the lion's share of the business there was to get, while the preponderant loss of sales fell on the unbranded and unadvertised goods.

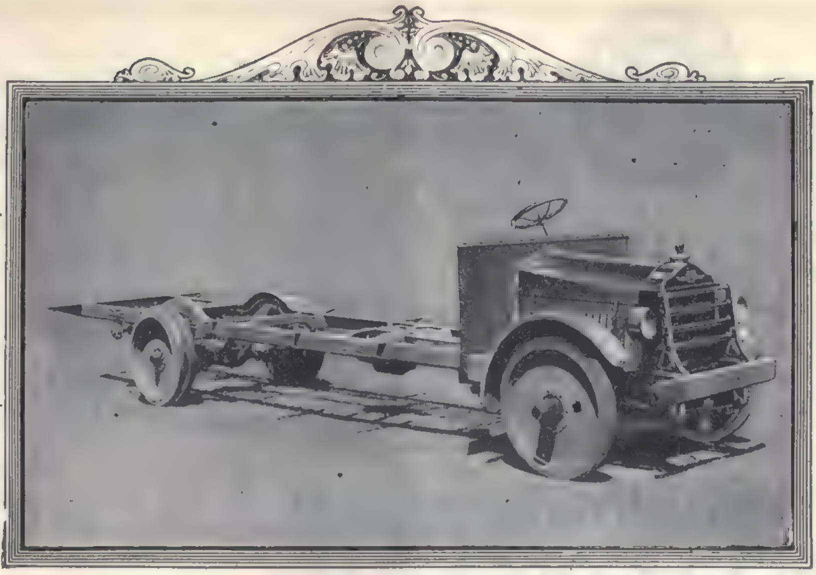
This was a great "showdown" for Advertising. Its position as a factor in economic life was on trial. Had it really done what had always been claimed for it? Had it created consumer preference that would hold against the keen competition of a sacrifice price on unmarked goods?

The verdict of the buying public was unqualified. It was not a straw vote to determine popularity. It was the final test of willingness to buy. The ballots were dollars. And the preponderant majority voted with their dollars that they preferred to keep right on buying advertised goods.

With the whole country on a reduced schedule of production and sales, the factories that were able to keep on producing, in anything like normal quantities, were invariably those making trademarked and nationally advertised goods.

All over the country today manufacturers, jobbers and merchants are giving serious consideration to this important and conspicuously demonstrated fact: buyers prefer advertised merchandise. And demand is the last word in all economic situations. No one can go against it and long endure.

[Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies]



8 Cheveaux — 40 Hommes?

The greatest attempt to transport passengers in motor freight trucks was in the A. E. F.

As a military necessity, this method served.

The war is over.

The need for passenger transport in freight cars is gone.

The MITTEN-TRAYLOR MOTORBUS is a real passenger carrying automobile.

Built by men long experienced in the transportation field, the MITTEN-TRAYLOR MOTORBUS is the epitome of all that is necessary in a passenger carrying vehicle.

MITTEN-TRAYLOR MOTORBUSES ARE

Smooth riding and comfortable
Economical to operate
Durable—Serviceable
Profitable

Write for descriptive Bulletin

MITTEN-TRAYLOR
INCORPORATED
Philadelphia

MITTEN
TRAYLOR

COLUMBIA'S

Best Known Specialties

BEARINGS
GEAR CASES
MOTOR COILS
TROLLEY WHEELS
TROLLEY EARS

A Service Station for Electric Railways

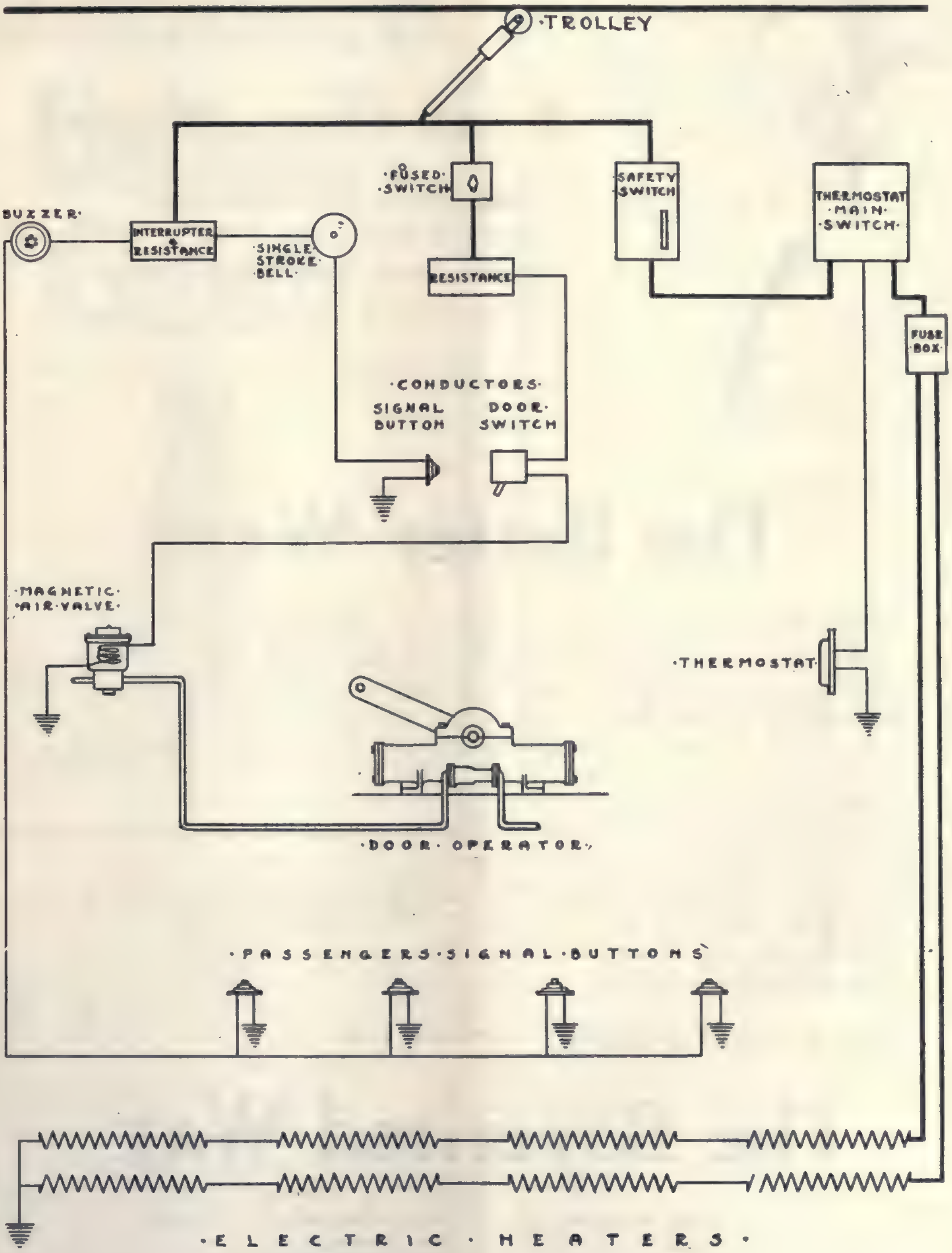
Specialists for many years in the manufacture of electric railway materials, practically our entire output is now consigned to your industry.

Although the items enumerated above are most widely used, we are making almost every kind of metal part and device used in car maintenance. Truck parts, motor parts and body fittings, standard or special, are all in our line. And we can make them at lower cost than your own shop.

Large stocks of standard parts always on hand, enable us to supply your wants promptly and satisfactorily. Use Columbia as your *service station.*

The Columbia Machine Works
and Malleable Iron Company
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. Green, Sales Mgr., Brooklyn, N. Y.
E. Keller, Brooklyn, N. Y.
F. C. Hedley, Brooklyn, N. Y.
J. L. Whittaker, 141 Milk St., Boston, Mass.
E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.



CONSOLIDATED CAR HEATING CO.

Albany—New York—Chicago

A Sad Story, Mates!

"It May Have Seen Better Days
"When It Was in Its Prime;
"It May Have Seen Better Days
"Once Upon a Time."

The Better Way

This little rhyme tells the sad story of a cheap and unsafe brake pin. Made of poor ingredients and lacking a hard, smooth finish, it soon begins to rust and roughen. That makes it all the easier for the shearing action of the brake rigging to get a strangle hold on the pin and shorten its life of safe usefulness.

Boyerized Brake Pins aren't made that way! Their glassy, diamond-hard finish is something more than a mere surfacing—it's an armor that can stand up against several hundred thousand miles of push and pull, of torsion and distortion. Pitted against the *first* cost of a poor pin, they seem expensive; but pitted against the *last* or accident cost of a poor pin, Boyerized Pins are inexpensive indeed.

And that's true of the entire Boyerized Line.

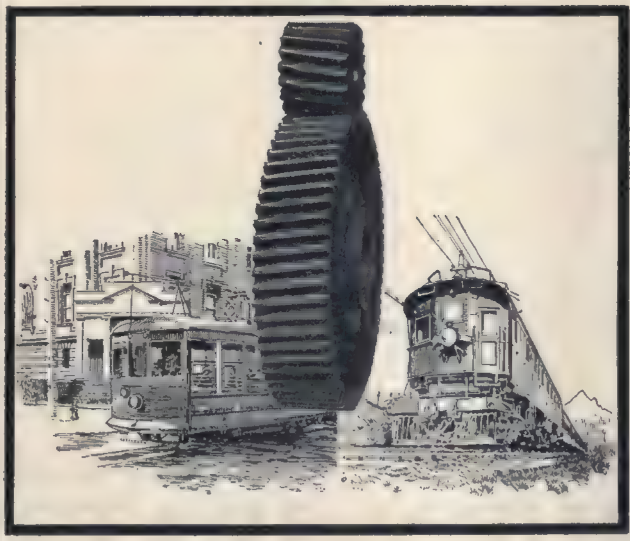
The Boyerized Way

Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates

BEMIS CAR TRUCK COMPANY
Electric Railway Supplies
Springfield, Mass.

REPRESENTATIVES:
Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

Standard Helical Gears



Your gears warn you loudly when there is excessive vibration and wear.

Nuttall Standard Helical Gears so reduce vibration and noise that a Los Angeles engineer reported several cars as coasting which actually passed his observation post under power.

Nuttall B. P. Treatment so reduces wear that mileages in excess of 250,000 no longer excite any comment, and mileages up to 500,000 are possible.

You can dismiss the gear problem if you use Standard Helical Gears.

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Umtoyati

The *umtoyati* among the Kaffirs are those who are born left-handed. They are witches and they can walk backward in a straight line on moonlight nights.

This careless habit of not facing the main issues that wait for them along the path has landed many of the *umtoyati* in Jungle Cats' bellies.

Regrettable it may be, but trouble inevitably comes to the bird who walks backward. He never sees what's coming until it hits him.

If your commutators seem to require too frequent dressing, don't blame it on the machine or on the heavy load it is carrying—just call in a Morganite Engineer and let him demonstrate what a wonderful change a little scientific Brush Prescription will make!

Face the issue squarely!

Morganite Brush Co., Inc.

Main Office and Factory:

519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co., 909 Penn. Ave., Pittsburgh

J. F. Drummey, 75 Pleasant St., Revere, Massachusetts.

W. R. Hendey Co., Hoge Bldg., Seattle

Herzog Electric & Engineering Co., 150 Steuart St., San Francisco

Special Service Sales Company, 502 Delta Bldg., Los Angeles

Railway & Power Engineering Corporation, Ltd., 131 Eastern Ave., Toronto, Ontario, Canada

Have you noticed?

Every time a "Question Box"
asks gear data, the answers
cite the records of
Cincinnati "Tool Steel."

HALE & KILBURN SEATS

are the BEST for
One Man Safety Cars

Specially designed for this service

Lightest Weight Stationary Steel Seat

Lightest
Strongest
Simplest
Neatest

Lightest Weight Walkover Steel Seat

Yet no higher in price than others

Specify H & K Seats for Your New Cars . .

Hale & Kilburn Corporation
American Motor Body Company, *Successors*
PHILADELPHIA

New York Chicago Washington Atlanta San Francisco Los Angeles

When you
think of
STEEL
think of
CARNEGIE

Open Hearth and
Bessemer Steel

Ingots
Billets—Blooms—Slabs
Sheet Bars

Track Material
Rails and Splice Bars—Steel Cross Ties

Rolled Structural Shapes
Reams, Channels, Angles, Tees and Zees
Steel Mine Timbers
Steel Sheet Piling
Universal and Sheared Plates—Skelp

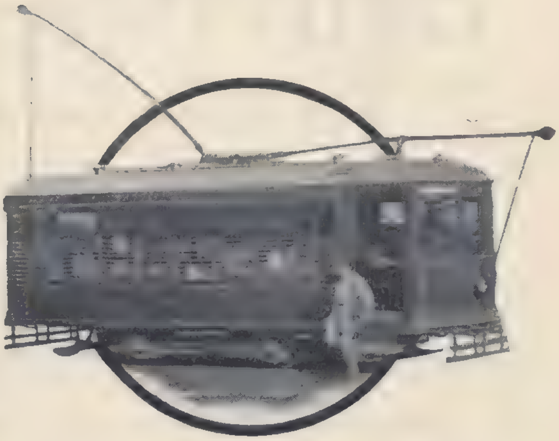
Forged Products
Standard Forged and Heat-Treated Axles
Wrought Steel Wheels and Gear Blanks
Locomotive Piston Blanks

Bar Mill Products
Squares, Rounds, Flats, Hexagons, Ovals
Open Hearth and Alloy Steel

Carnegie Steel Company
GENERAL OFFICES:
Carnegie Building : : : Pittsburgh, Pa.

1566

St. Louis
Quality
Cars



Meeting Competition

Only by offering a product of superior quality have we held our place in the keen competition for car orders throughout the history of the electric railway industry.

Until recently the railways themselves have had no competition to worry them. But since the advent of the jitney automobile, conditions have been different.

Now they are learning what we have experienced all along—that the quality of the product counts the most. Service of better quality—faster, more frequent, and of greater all-round attractiveness is needed.

You can give Quality Service with St. Louis Quality Cars.

Let us figure on your order.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

Griffin Wheel
Company
McCormick Building
Chicago, Ill.

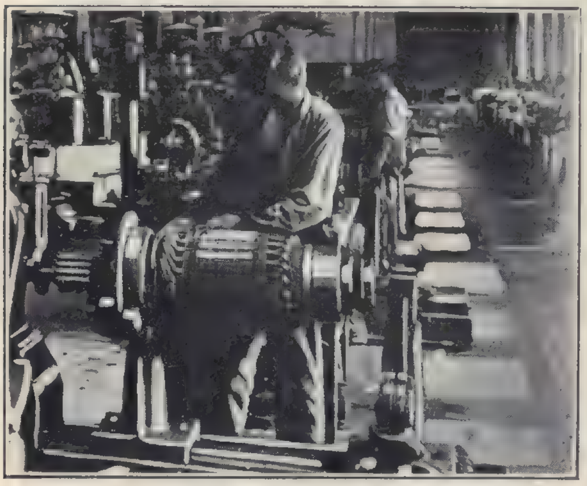
GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

FOUNDRIES:

Chicago
Detroit
Denver
Boston
Kansas City
Council Bluffs
St. Paul
Los Angeles
Tacoma



Get better service from armatures with

IRVINGTON

Black Varnished Cambric

30% Higher Dielectric Strength
100% Better Heat Resistance
100% More Alkali and Acid Resistance
200% Better Aging Qualities
200% More Resistance to Oil.
Than Yellow Varnished Cambric

Send for samples

Irvington Varnish & Insulator Co., Irvington, N. J.
ESTABLISHED 1905

Sales Representatives

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Clapp & LaMoree
Los Ang. & San Francisco, Cal.

Consumers Rubber Co.
Cleveland, O.

E. M. Wolcott
Rochester, N. Y.

L. L. Fleig & Co.
Chicago, Ill.

F. C. Scofield
Toronto, Ont., Canada

AMERICAN ELECTRICAL WORKS
AMELECTRIC
Wires and Cables
PHILLIPSDALE, R.I.

Reg. U. S. Pat. Office
Galvanized Iron and Steel Wire and Strand

Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

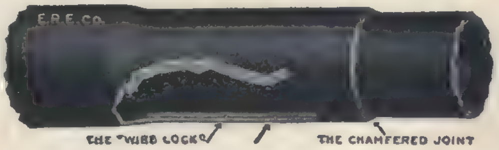
PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 233 B'way.

ELRECO TUBULAR POLES



COMBINE

Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**

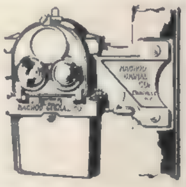
Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KY.



Chapman
Automatic Signals

Charles N. Wood Co., Boston

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way.
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, E. C. 4, 38-39 Upper Thames St.

Electrical Wires and Cables

JOHN A. ROEBLING'S SONS CO., Trenton, N. J.

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
TRIPLEX

Arc Weld and Flame Weld

Send for new Rail Bond book

American Steel & Wire Company
CHICAGO
NEW YORK

NASHVILLE TIE COMPANY

Cross Ties: White Oak, Chestnut, and Treated Ties. Oak Switch Ties.

Prompt shipment from our own stocks.

Headquarters—Nashville, Tenn.

A. D. Andrews, Terre Haute, Ind., Representative.

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

U. S. Electric Contact Signals
for

Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work

United States Electric Signal Co.
West Newton, Mass.

STANDARD

Wires, Cables, Cable Accessories
Superior quality, economical prices
Standard Underground Cable Co.
Boston Philadelphia Pittsburgh Detroit
New York Washington Chicago S. Louis
San Francisco

ANACONDA TROLLEY WIRE

THE AMERICAN BRASS COMPANY
General Offices
WATERBURY, CONN.

ANACONDA
from mine to consumer

ANACONDA COPPER MINING COMPANY
Rolling Mills Department
CHICAGO, ILL.

THE INDIANAPOLIS SWITCH & FROG CO., SPRINGFIELD, OHIO

Indianapolis Economy Products That Make Dollars "Grow"

Indianapolis Solid Manganese:

Frogs, Crossings, Mates and Tongue-switches. Super-quality material. Par-excellent designs. Gives many lives to one, of ordinary construction, and when worn down, CAN BE RESTORED by INDIANAPOLIS WELDING.

Indianapolis Electric Welder:

Efficient, Rapid, ECONOMICAL, Durable. Price, $2.00 (per day for three hundred days) thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

Indianapolis Welding Steel:

Fluxated heat treated Metal Electrodes, insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untreated.

Indianapolis Welding Plates:

Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and COUNTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

Indianapolis Welding Supplies:

CABLES, HELMETS, LENSES, CARBONS.

Turntables:

Ball-bearing, for ash-pits, storage yards, etc.

Indianapolis "Economy" Products

are Pre-eminently "Money Savers," YES—"Money Makers" for Electric Railways.

SPECIALISTS

in the

Design and Manufacture

of

Standara—Insulated—and Compromise Rail Joints

The Rail Joint Company

61 Broadway, New York City

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

SPECIAL TRACKWORK

Of the well-known **WHARTON** Superior Designs *and* Constructions

Steel Castings **Converter and Electric**	**Forgings** **Drop Hammer and Press**	**Gas Cylinders** **Seamless Steel**

Wm. Wharton Jr. & Co. Inc., Easton, Pa.
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Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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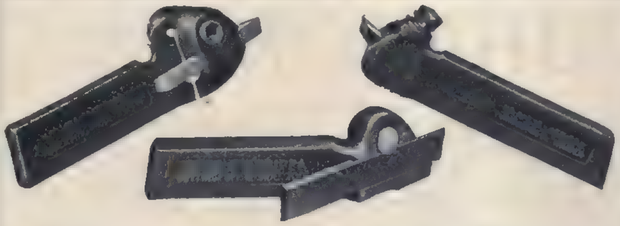
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building



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An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

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Tulc, a lubricant, gives many advantages, in operation *and* reduces the cost of lubrication. Our service men are engineers, and besides advising proper methods, will pack your cars, show you how and why Tulc should be used, and get money-saving results. Ask us for details.

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Hartman Centering Center Plates
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H & W Electric Heaters
Garland Ventilators
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National Safety Car Equipment Co.'s One-Man Safety Cars
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Circuit Breakers
for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.
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For 60 years we have been importing rattan from the Islands in the Indian Ocean. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

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International Registers

Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
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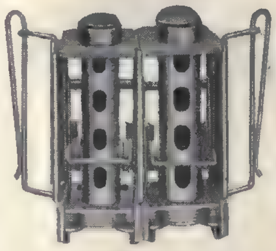

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The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

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Each barrel a separate unit, permitting the conductor to interchange the barrels, to suit his personal requirements and to facilitate the addition of extra barrels.

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Ravenswood, Chicago, Ill.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

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Manufactured by electrical engineers who will understand your insulating problems and render intelligent service. Noted for uniformity and quality. It will pay you to get in touch with

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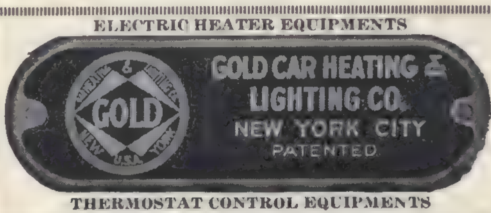

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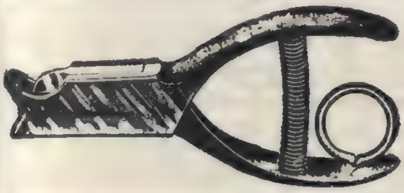

The Standard Railway Punch for 20 years

Send for Catalog

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The Rex-L Turnstile
Model 50

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Rochester, N. Y.

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SUPERINTENDENT of transportation, with a proven successful record of 18 years on large city, suburban and interurban properties, at present employed, desires a change and will consider any property that needs a capable, efficient official who possesses a full knowledge of all details of transportation and is capable of getting results. Very successful in public relations and dealing with labor. Best of references from leading men in electric railway field. Personal reasons for desiring change. PW-455, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

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Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents — send copies.

0195

FOR SALE

Registers, Fare Boxes

For Sale—62 Type R-5 International double registers, and 38 No. 2025 Johnson fare boxes; in good condition. Gary Street Railway Co., Gary, Ind.

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1—Set New Russell Ends with attachments.

TRANSIT EQUIPMENT COMPANY.
Cars—Motors
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RAILS

of all Sections

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Write or wire when in the market to BUY or SELL

Please Mention this Publication

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trucks and motors

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97% Of The Canadian Street Railways Use Our Products

Prominent Canadian manufacturer is in a position to take over in Canada the manufacture and sale of street railway supplies and desires to negotiate with American manufacturers with that purpose in view.

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Company is well established, and has good connections throughout the Dominion, being in touch with all Canadian street railway officials.

President will attend the A.E.R.A. Convention at Chicago and will be glad to personally discuss arrangements at that time. Interested manufacturers can communicate with him by addressing.

B. O. 461, Electric Railway Journal, Leader-News Building, Cleveland, O.

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

0098

WAR DEPARTMENT SELLING PROGRAM

SEPTEMBER

Sept. 19—TRAILERS—Jeffersonville, Ind., Auction. For catalog write Motor Transport Division, Office Q. M. G., Washington, D. C.; or C. O., Q. M. Depot, Jeffersonville, Ind.

Sept. 19—ORDNANCE MATERIAL, Frankford, Pa., Auction. For catalog write C. O., Frankford Arsenal, Philadelphia, Pa.

Sept. 20—ORDNANCE MATERIAL, Tullytown, Pa., Auction. For catalog write to address above.

Sept. 21—ORDNANCE MATERIAL, Morgan, N. J., Auction. For catalog write to address above.

Sept. 21—Q.M. SUPPLIES—Omaha, Neb., Auction. For catalog write Q. M. S. O., 1819 W. Pershing Rd., Chicago, Ill.

Sept. 22—AIR SERVICE EQUIPMENT Houston, Tex., Auction. For catalog write C. O., Aviation Gen'l. Supply Depot, Houston, Tex.

Sept. 25—ORDNANCE MATERIAL—Aberdeen, Md., Auction. For catalog write C. O., Aberdeen Proving Grounds, Aberdeen, Md.

Sept. 26—Q. M. SUPPLIES—New Orleans, La., Auction. For catalog write C. O., Q. M. Surplus Property Depot, Atlanta, Ga.

Sept. 27—ORDNANCE MATERIAL—Watervliet, N. Y., Auction. For catalog write C. O., Watervliet Arsenal, Watervliet, N. Y.

Sept. 28—Q. M. SUPPLIES—Camp Devens, Mass., Auction. For catalog write C. O., Boston Gen'l Intermed. Depot, Boston, Mass.

Sept. 29—Q. M. SUPPLIES—Norfolk, Va., Auction. For catalog write Q. M. S. O., 1st. Ave. & 59th St., Brooklyn, N. Y.

OCTOBER

Oct. 3—Q. M. SUPPLIES—Camp McClellan, Ala., Auction. For catalog write C. O., Q. M. Surplus Property Depot, Atlanta, Ga.

Oct. 4—HARNESS—Jeffersonville, Ind., Auction. For catalog write C. O., Q. M. Gen'l. Supply Depot, Jeffersonville, Ind

Oct. 4, 5, 6—ORDNANCE MATERIAL—Erie Howitzer Plant, Pa., Auction. For catalog write C. O., Frankford Arsenal, Philadelphia, Pa.

Oct. 5, 6—Q. M. SUPPLIES—Camp Knox, Ky., Auction. For catalog write Q. M. S. O., 1819 W. Pershing Rd., Chicago, Ill.

*Oct. 10—MEDICAL SUPPLIES—New York City, Auction. For catalog write Surplus Property Sect., Office Surgeon General Wash., D. C.

Oct. 10—AIR SERVICE EQUIPMENT—Dorr Field, Fla., Auction. For catalog write Commanding Officer, Dorr Field, Fla.

Oct. 11, 12—AIR SERVICE EQUIPMENT—Carlstrom Field, Fla., Auction. For catalog write Commanding Officer, Carlstrom Field, Fla.

Oct. 17—Q. M. SUPPLIES—Camp Dix, N. J., Auction. For catalog write Q. M. S. O., 1st. Ave. & 59th. St., Brooklyn, N. Y.

Oct. 24—AIR SERVICE EQUIPMENT—Montgomery, Ala., Auction. For catalog write C. O., Air Reserve Depot. Montgomery, Ala.

*Oct. 27—MEDICAL SUPPLIES—Wash., D. C., Auction. For catalog write Surplus Property Sect., Office Surgeon General, Wash., D. C.

Oct. 30—AIR SERVICE EQUIPMENT—Richmond, Va., Auction. For catalog Write C. O., Air Reserve Depot, Richmond, Va.

* Sales dates indicated by the asterisk are as yet only tentative.

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J. L. Frink, Chief, Sales Promotion Section
Office, Director of Sales
Room2515, Munitions Building, Washington, D.C.

ARTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Axles
Bemis Car Truck Co.
Cambria Steel Co.
Midvale Steel & Ord. Co.
St. Louis Car Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Babbitt Metal
More-Jones Br. & Metal Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The
Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
More-Jones Br. & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp'n.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
St. Louis Car Co.

Benders, Rail
Railway Track-work Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
Cambria Steel Co.
Midvale Steel & Ordnance Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Railway Track-work Co.

Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
American Bridge Co.
Bates Exp. Steel & Tr. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Westinghouse Tr. Br. Co.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel or Rattan
Amer. Rattan & Reed Mfg. Co.

Brushes, Carbon
General Electric Co.
Jeandron W. J.
Le Carbone Co.
Morganite Brush Co., Inc.
Westinghouse E. & M. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Bunkers, Coal
American Bridge Co.

Buses, Motor
Brill Co., The J. G.
Mitten-Traylor Incorporated
Republic Truck Sales Corp.
Bushings
Nat'l Fibre & Insulation Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Cables (See Wires and Cables)
Cambric, Tapes, Yellow & Black Varnished
Irvington Varnish & Ins. Co.
Carbon Brushes (See Brushes Carbon)
Car Lighting Fixtures
Elec. Service Supplies
Car Panel Safety Switches
Consolidated Car-Heating Co.
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.

Cars, Passenger, Freight Express, Etc.
Amer. Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
More-Jones Br. & Metal Co.

Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Circuit Breakers
Cutter Co.
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co. A. & J. M.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Clusters and Sockets
General Elcetric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.

Coils, Armature and Field
Columbia M. W. & M. I. Co.
Economy Elec. Devices Co.
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
General Electric Co.
Westinghouse E. & M. Co.
Coin-Counting Machines
Electic Service Sup. Co.
Internat'l Register Co., The
Johnson Fare Box Co.
Commutator Slotters
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersol-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air, Portable
Ingersoll-Rand Co.

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Cambria Steel Co.
Midvale Steel & Ordnance Co.

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General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Condensor Papers
Irvington Varnish & Ins. Co.

Connectors Solderless
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General Electric Co.
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Controller Regulators
Electric Service Sup. Co.

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Westinghouse E. & M. Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Conveying and Hoisting Machinery
American Bridge Co.
Columbia M. W. & M. I. Co.

Copper Wire
Anaconda Copper Min. Co.

Cord Adjusters
Nat'l Fibre & Insulation Co.

Cord, Bell, Trolley Register, etc.
Brill Co., The J. G.
Electric Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
Samson Cordage Works
Silver Lake Co.

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Electric Service Sup. Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cranes
Allis-Chalmers Mfg. Co.

Cross Arms (See Brackets)

Crossing Foundations
Internationa Steel Tie Co.

Crossing Manganese
Indianapolis Switch & Frog Co.

Crossing Signals (See Signals, Crossing)

Crossings, Frog & Switch
Wharton, Jr., & Co., Wm.

Crossings Track (See Track, Special Work)

Crushers, Rock
Allis-Chalmers Mfg. Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Sup. Co.
Morton Mfg. Co.
St. Louis Car Co.

Dealers' Machinery
Electric Equipment Co.

Derailing Devices (See Track Work)

Destination Signs
Columbia M. W. & M. I. Co.
Eectric Service Sup. Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.
Door Operating Devices
Con. Car-Heating Co.
Nat'l Pneumatic Co., Inc.
Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Corp.
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Draft Rigging (See Couplers)
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co
Electric Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Electric Service Sup. Co.
Electrical Wires and Cables
Amer. Electrical Works
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Electrodes, Carbon
Indianapolis Switch & Frog Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.

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Archbold-Brady Co.
Arnold Co., The
Beeler, John
Byllesby & Co., H. M.
Day & Zimmermann
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter
Kelly, Cooke & Co.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Inc., Dwight P.
Sanderson & Porter
Sangster & Matthews
Smith & Co. C. E.
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White Engeneering Corp., The J. G.
Witt, Peter

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Johnson Fare Box Co.
National Ry. Appliance Co.

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Midvale Steel & Ordnance Co.

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American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Sup. Co.

Fibre and Fibre Tubing
Nat'l Fibre & Insulation Co.
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flooring Composition
Amer. Mason Safety Tread Co.

Floor Plates
Amer. Abrasive Metals Co.

Forgings
Cambria Steel Co.
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Midvale Steel & Ordnance Co.
Williams & Co., J. H.

Frogs, Track (See Track Work)
Wharton, Jr., & Co., Wm.

Fuses and Fuse Boxes
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Consolidated Car-Heating Co.
General Electric Co.
Westinghouse E. & M. Co.
Williams & Co., J. H.

Fuses Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

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Westinghouse Tr. Br. Co.

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General Electric Co.

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Westinghouse E. & M. Co.
Gasoline Torches
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Gates, Car
Brill Co., The J. G.

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Carnegie Steel Co.
Midvale Steel & Ordnance Co.

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Electric Service Sup. Co.
Westinghouse E. & M. Co.

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Electric Service Sup. Co.
General Electric Co.
National Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

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General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
English Electric Co., Ltd.
General Electric Co.
Westinghouse E. & M. Co.

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Indianapolis Switch & Frog Co.
Smith Heater Co., Peter

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Morganite Brush Co.

Greases (See Lubricants)

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Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.

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Gladium Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttall Co., R. D.
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General Electric Co.
Ohio Brass Co.
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Heaters, Car (Electric)
Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Meater Co. Peter

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Smith Heater Co, Peter

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Ohio Brass Co.

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Electric Service Sup. Co.
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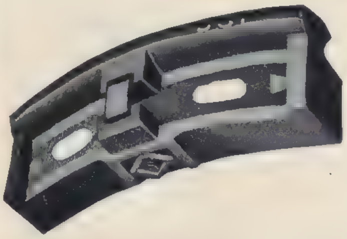

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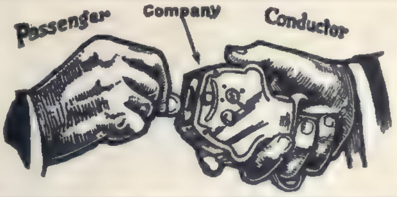

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Economy Electric Devices Co.

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Rubber Insulated Metals Corp.
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Pneumatic Tools

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Hubbard & Co.

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Bates Exp. Steel Truss Co.
Electric Ry. Equip. Co.
Hubbard & Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
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Electric Service Sup. Co.

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Electric Service Sup. Co.
Hale & Kilburn Corp.
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Registers and Fittings
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Electric Service Sup. Co.
Internat'l Reg. Co., The
Rooke Automatic Reg. Co.

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Carnegie Steel Co.

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Repair Work (See also Coils)
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General Electric Co.
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Westinghouse E. & M. Co.

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Westinghouse E. & M. Co.

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Stafford Roller Bearing Car Truck Corp'n.

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Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

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Brill Co., The J. G.

Sash, Metal Car Window
Hale & Kilburn Corp.

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Screw Drivers, Rubber Insulated
Electric Service Sup. Co.
Rubber Insulated Metals Corp.

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Brill Co., The J. G.

Seats, Car (See also Rattan)
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Brill Co., The J. G.
Hale & Kilburn Corp.
Heywood-Wakefield Co.
St. Louis Car Co.

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Electric Equipment Co.

Secret Service
Corp. Service Bureau. The

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Brill Co., The J. G.

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Brill Co., The J. G.
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Con. Car Heating Co.
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Electric Service Sup. Co.
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Midvale Steel & Ord. Co.
Morton Mfg. Co.

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Amer. Mason Safety Tread Co.
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

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Electric Service Sup. Co.
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Ohio Brass Co.

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General Electric Co.
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Economy Elec. Devices Co.

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Ford Chain Block Co.

Trolley Wheel and Harps
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Ohio Brass Co.
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Westinghouse E. & M. Co.

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Bemis Car Truck Co.
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Cambria Steel Co.
Midvale Steel & Ord. Co.

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Columbia M. W. & M. I. Co.
Copper Products Forging Co.
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Electric Service Sup. Co.
General Electric Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

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Roebling's Sons Co., J. A.

Wires and Cables
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Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Cambria Steel Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Midvale Steel & Ord. Co.
Roebling's Sons Co., J. A.
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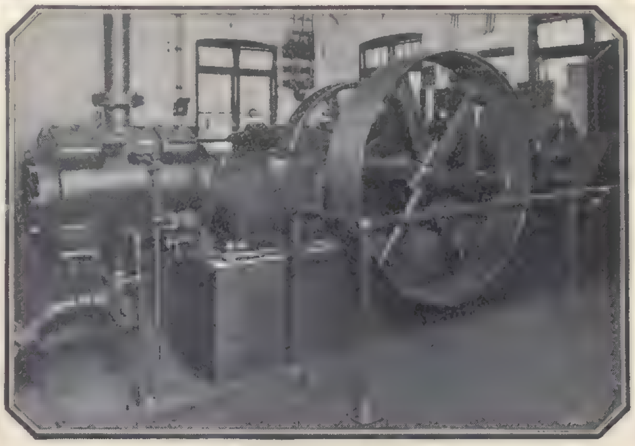
Let us explain.

The Cleveland Fare Box Co.
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario



Small Air Compressors

Class "ER" belt driven air compressors are particularly adapted to the needs of switch and signal service. These machines are also the popular selection for small erection and repair shops.

Their enclosed construction, automatic lubrication and noiseless plate air valves result in the highest operating efficiency and reliability.

Ingersoll-Rand
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Waterproofed Trolley Cord

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

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If you are not familiar with the quality you will be surprised at its **ENDURANCE and ECONOMY.**

Sold by Net Weights and Full Lengths

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Manufacturers of bell, signal and other cords.
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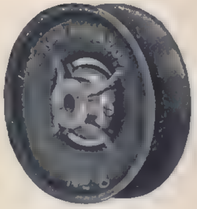
The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be mislead by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



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KALAMAZOO, MICH., U. S. A.

"They're forged—not cast—that's why they last"

Specify on Your New Equipment

"CLEVELAND" ALL COPPER

(No Alloy)

TROLLEY WHEELS

With the additional life due to full BALANCE and UNIFORMITY there is a much HIGHER SALVAGE value in pure copper.

A trial order will convince

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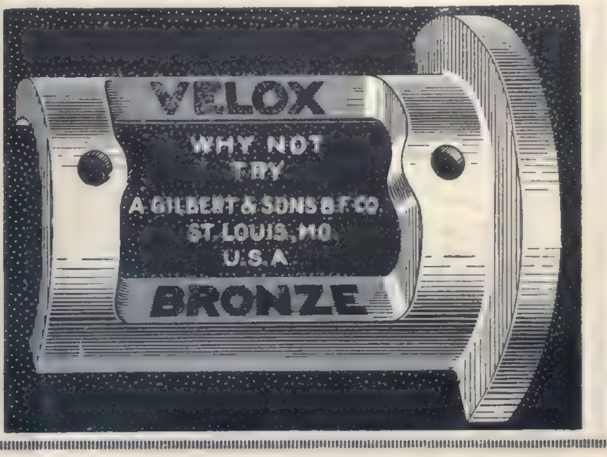
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WHY NOT TRY
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MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY

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Consolidated Steel Corporation, 25 Broadway, New York, is the sole exporter of our commercial products.

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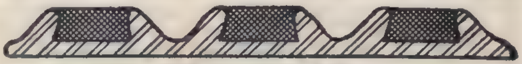
RAILWAY UTILITY COMPANY
Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.
141-151 WEST 22D ST. Chicago, Ill.
Write for Catalogue
1328 Broadway New York, N. Y.

Kass Safety Treads
present an unusual combination in that they give better results at less cost.
Manufactured and sold by
MORTON MANUFACTURING CO., *Chicago*

FERALUN Anti-Slip Treads
Car Steps
Floor Plates
Station Stairs
Door Saddles, etc.
AMERICAN ABRASIVE METALS CO.
50 Church St., New York City

It's iron and emery cast together



Any width, with or without nosing
MASON SAFETY TREAD
for car and station steps
Standard for 15 years
Stanwood Steps and Karbolith Flooring
American Mason Safety Tread Co., Lowell, Mass.
Branch offices in New York and Philadelphia
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SEE OUR CATALOGUE IN SWEET'S

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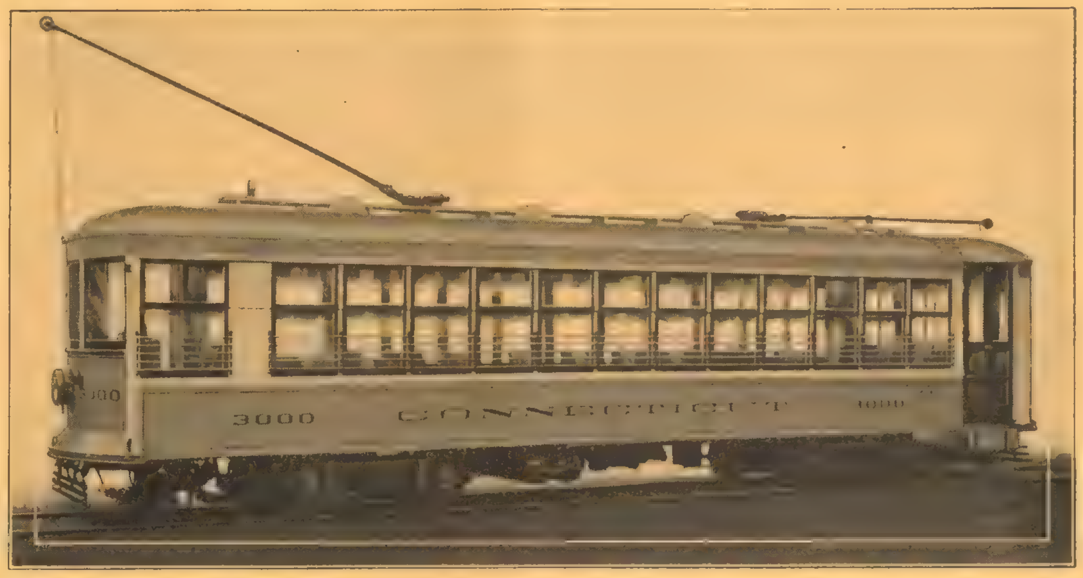

Light-Weight Cars

Brill Low-Level Truck No. 77-E1

In the development of light-weight cars and trucks for either suburban or interurban service, there must be taken into consideration not only the elimination of excessive weight but also there must be an assurance that the cars will adequately meet the requirements of the contemplated service.

The Connecticut Company recently received cars of the type illustrated from the Wason Manufacturing Company, which are excellent examples of light-weight car construction. This type car measures 40 ft. 3 in. over bumpers, 8 ft. 2⅝ in. wide overall, seats 53 passengers and weighs, complete, 27,700 lb.

These cars are mounted on Brill Low-Level Trucks No. 77-E1, 4 ft. 10 in. wheel base and having 26-in. diameter wheels.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO. — G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.
CANADIAN BRILL CO., LTD., PRESTON, ONT.

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

CANDLER BUILDING, THE HOME OF COLLIER SERVICE

Barron G. Collier

INCORPORATED

Candler Bldg., New York

McGraw-Hill Co., Inc.

Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

September 16, 1922

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SILVER LAKE
TROLLEY CORD
THOROUGHLY WATERPROOFED
is unsurpassed for
Economy and Long Service
A trial will convince you of its superiority
Bell and Register Cord
of equal quality—in all sizes and colors
Send for a sample today
SILVER LAKE CO. - Newtonville, Mass.

"Joe," said the Vice-President, "I understand the manufacturers are all planning on the best Convention exhibit they ever had, so be sure and arrange for a number of your lead men to attend. Pick out the ones whom you feel will make the most of this opportunity for the company and themselves and arrange for each man to make a detailed report of the exhibits when he returns. I also want you personally to report on the passenger and dispatch freight service of the Chicago, North Shore high speed line. I understand the service and achievements of this road are truly remarkable."

"That's 'music' to me, Boss. We'll be there. I happen to know this road has practically standardized on Westinghouse No. 557—140-hp. motors and HL control, and have recently ordered about 25 new cars. We also may have a chance to see how the weekly pass works out on the Chicago Elevated Lines. They seldom, if ever, make a move out there unless they know success is a foregone conclusion. They just ordered one hundred new cars for the 'L' lines, too."

"Yes, Joe," soliloquized the Vice-President, "there is a lot we can learn in Chicago in addition to attending the Convention."

A.E.R.A.
CONVENTION
Chicago
OCTOBER 2-6
1922

MEMBER
AMERICAN ELECTRIC RAILWAY ASSOCIATION
AERA
1922

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Vol. 60, *No.* 12 New York, September 16, 1922 *Pages* 379-416

ELECTRIC RAILWAY JOURNAL

Henry W. Blake, Editor

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The Convention Issue Next Week

The 1922 Convention Issue of the *Electric Railway Journal* will be one of the most valuable ever published. The fact that the convention is to be held in Chicago this year furnished a topic of unexampled interest. The Chicago district contains the largest city surface electric railway system under one management in the country. In addition, there are in and about Chicago highly developed rapid transit lines and high-speed interurban electric railways.

The articles in this issue are not mere descriptions of the properties. Instead, they consist, for the most part, of contributions by the members of the operating staffs of the various companies and the supervising engineering bodies, giving first-hand accounts of Chicago electric railway experience with respect to power distribution, track, car equipment and traffic.

In no city in the country, probably, has greater attention been given to the consideration of establishing electric railway service on fundamentally sound engineering lines than in Chicago. Under the ordinance of 1907 the surface properties were completely rehabilitated. Since then all work has been carried on along definite programs. The issue next week will tell what the results have been from the types of construction and equipment adopted during the modernizing processes.

The number will include articles on the following topics:

What Chicago's Loop Traffic Problem Is.

Development of Joint Use of Power Facilities.

Experience in Maintaining the Structure and Track of the Elevated Railroads.

Experience with Various Types of Track Under the Severe Traffic Conditions of Chicago Surface Lines.

Experience in Improving and Maintaining the Roadbed of the Chicago-Milwaukee Electric Railroad.

How Ordinary Span-Type Overhead is Used in High-Speed Interurban Service.

How the North Shore Line Has Been Built Up.

Development of Street Car Design in Chicago.

Development of Passenger Car Design for a High-Speed Electric Railroad.

Development of Chicago Elevated Car Design.

Experience and Study in Ventilation of City Cars.

Experience of the Chicago Surface Lines with Educational Publicity.

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(Published in San Francisco)
Industrial Engineer
(Published in Chicago)
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Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.
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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U. S. A.

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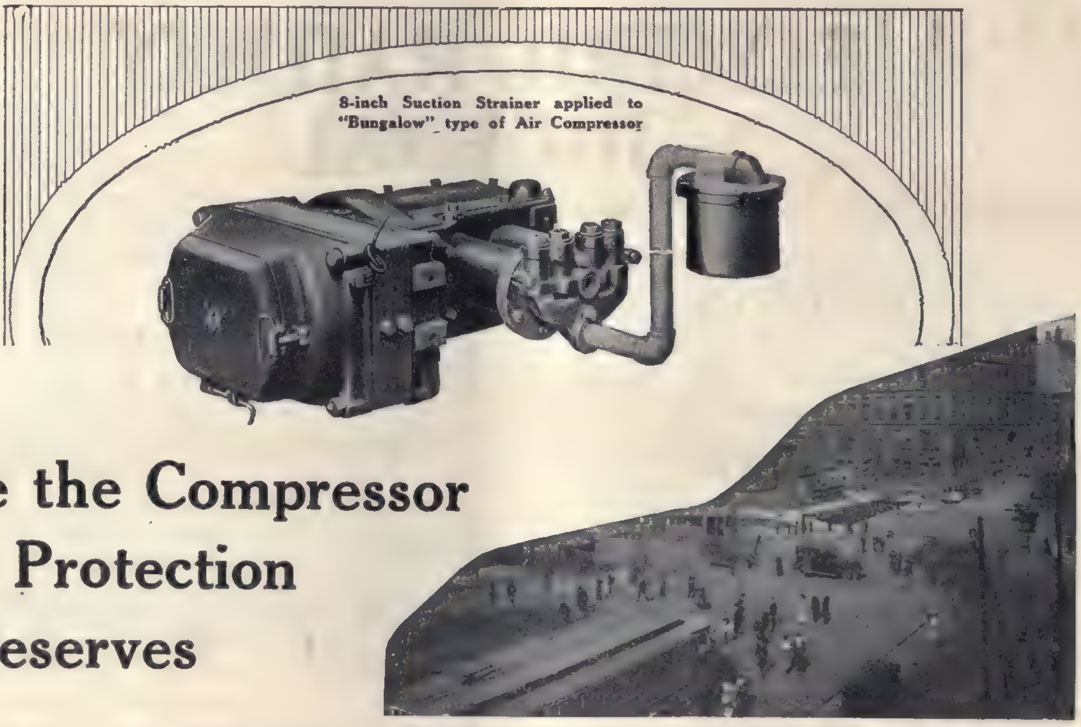


8-inch Suction Strainer applied to "Bungalow" type of Air Compressor

Give the Compressor The Protection It Deserves

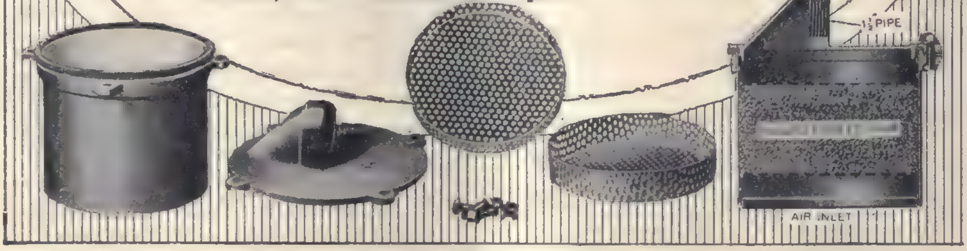
THE air compressor, as one of the most essential factors in modern railway operation, deserves adequate protection against any condition which may tend to affect its efficiency.

The Westinghouse 8-inch Suction Strainer provides positive protection against one of the commonest causes of complaint—that of dust and dirt being drawn into the compressor cylinders with the suction air.

All air used in compressors equipped with 8-inch Suction Strainers is filtered through a thick bed of pulled curled hair, thus insuring a state of cleanliness which adds materially to the life and efficiency of the compressor and reduces maintenance expense by permitting the lubricating oil to perform its intended function instead of becoming a gritty compound which cuts away the working surfaces.

The capacity of the 8-inch Strainer is sufficient to meet the requirements of any compressor having a displacement not exceeding 38 cubic feet per minute.

Descriptive Leaflet No. 2422, containing further information of interest concerning the 8-inch Suction Strainer, will be mailed on request.



Westinghouse Traction Brake Company

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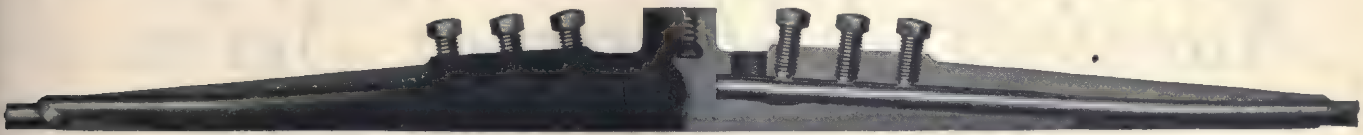
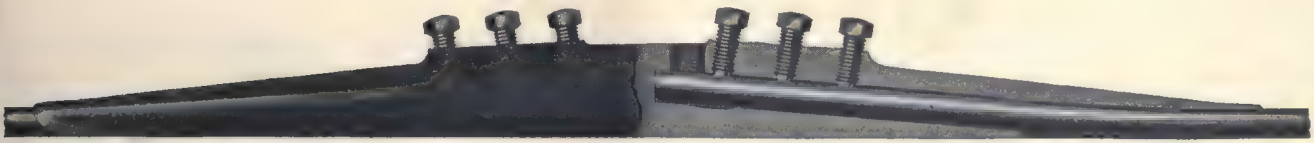
TRADE MARK

WESTINGHOUSE TRACTION BRAKES

O-B Improved Type C Splicer



O-B Type C Splicing Ear—21 inches long—(Patented)
Shown on 2-0 Round Wire—made for all sizes of round, grooved and Figure 8 Wire



O-B Type C Splicer—20 inches long—(Patented)
Shown on 4-0 Round Wire—made for all sizes of round, grooved and Figure 8 Wire and to take two kinds of wire.

Lasts as long as the wire —and makes wire last longer

O-B patented splicer approach as used on O-B Type C Splicer

Before Peening

Wire Installed

More life and more strength have been put into O-B Type C Splicers.

Turn to pages 342 and 343 of Catalog No. 18 and you'll see the former design which was a good splicer and a popular one. But compare the illustrations with the ones in this advertisement.

You'll find there's more metal on the under-run—enough wearing section has been added to make the splicer last fully as long as the wire.

Peep holes show when the wire is clear in. Approach lips have been shortened to give a better under-run.

These improvements have not changed at all the straight-away wire entrance which is at the foundation of Type C popularity. No kink is required in the trolley wire. This feature speeds up installation, lengthens wire life and makes the short lips and unusually smooth approach possible.

O-B Type C Splicer is especially good for use on worn wire which needs nursing if it is to stay in service.

Prompt shipment.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus Marsh & McLennan Service

OTHER THINGS BEING EQUAL—Marsh and McLennan would not be carrying the insurance for a great number of the largest public utilities in America.

The public is no more interested in where you buy your insurance than they are interested in where you buy your rails or cars or other equipment.

Marsh and McLennan solicit your insurance solely because they can render you a service that will decrease your insurance costs.

On one large eastern Corporation, for example, we were able to reduce the insurance rate from $17.50 per thousand to $4.30 per thousand. Why not buy your insurance where you can buy the most for your money

We will be glad to outline this service to business executives who are interested in reducing insurance costs.

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San Francisco
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Cleveland
Winnipeg
Montreal
London

A Big Year in Track Construction

is a big year for

STEEL TWIN TIES

MORE paved track is being laid this year than for the past five and, naturally, 1922 is a big year for STEEL TWIN TIES.

From San Diego, California, to Boston, Massachusetts, the initial economy and proven dependable performance of Steel and Concrete for track foundations have decided more and more companies for Steel Twin Tie Track.

Lower material and labor costs say "Rebuild paved track *now!*" But select the type of paved construction with the lowest cost per foot, per year.

For comparative records in your consideration of this question write today for our complete data folder. It presents details of the twelve-year record of Steel Twin Tie Track and includes an estimate of the cost of Steel Tie construction on your lines.

When checking over your convention program add this note—see the Steel Tie exhibit, booths 113 and 114, Sec. D, Municipal Pier.

The International Steel Tie Company
Cleveland, O.

Steel Twin Tie Track

THERMIT INSERT RAIL WELD

Recently Improved

Improvements Now Save You $2.00 to $3.00 per Joint

Results of drop tests on improved. "Center Pour" Thermit Insert Rail Weld, showing fractures outside of weld.

Drop Tests Prove Weld Absolutely as Strong as Rail

As a result of six recent repeated drop tests, involving 20 drops of 2,000-pound and 2,500-pound weights, varying in heights from 12 in. to 9 ft., 134-lb. rail sections welded by this improved method, and placed on 6-in. Tee rail on 3-ft. centers, finally broke outside of the weld in every test.

The modified weld involves no fundamental changes from the type of Thermit Insert Weld which has been used extensively for ten years by street railways for eliminating rail joints in paved track throughout the United States. By exhaustive research, it was found possible to gradually change the design so as to utilize the Thermit steel in the most scientific manner, thus reducing the amount necessary.

When installed in conjunction with our lately improved Thermit rail welding appliances, there should be no trouble in making 35 to 40 joints per day with a comparatively small gang.

Tell us the section number of your rail so we can quote you on suitable welding material. We will also be glad to send you an expert demonstrator to show you how inexpensive the improved Thermit Insert Weld is.

Metal & Thermit Corporation

120 Broadway, New York

PITTSBURGH CHICAGO BOSTON S. SAN FRANCISCO TORONTO

North, East, South, West!

KEYSTONE
CAR SPECIALTIES

Illuminated Destination Signs
Steel Gear Cases
Motormen's Seats
Faraday Car Signals
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Golden Glow Headlights
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Trolley Catchers
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Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels

Check off your wants and send for respective data sheets today

You'll find ranking railways of the country specifying from this list

If we started in to enumerate the systems satisfactorily using one or more of the Keystone Car Specialties listed on this page, we'd have to mention nearly every electric railway line in the United States. This universal approval of Keystone Specialties is very gratifying, but we won't be entirely happy till we see our good friends standardizing on the *complete line* of Keystone Car Specialties.

Maybe you have'nt the entire file of Keystone data sheets. Shall we send them?

ELECTRIC SERVICE SUPPLIES CO.
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Streets	50 Church Street	Monadnock Bldg.

Branch Offices: **Boston, Scranton, Pittsburgh**
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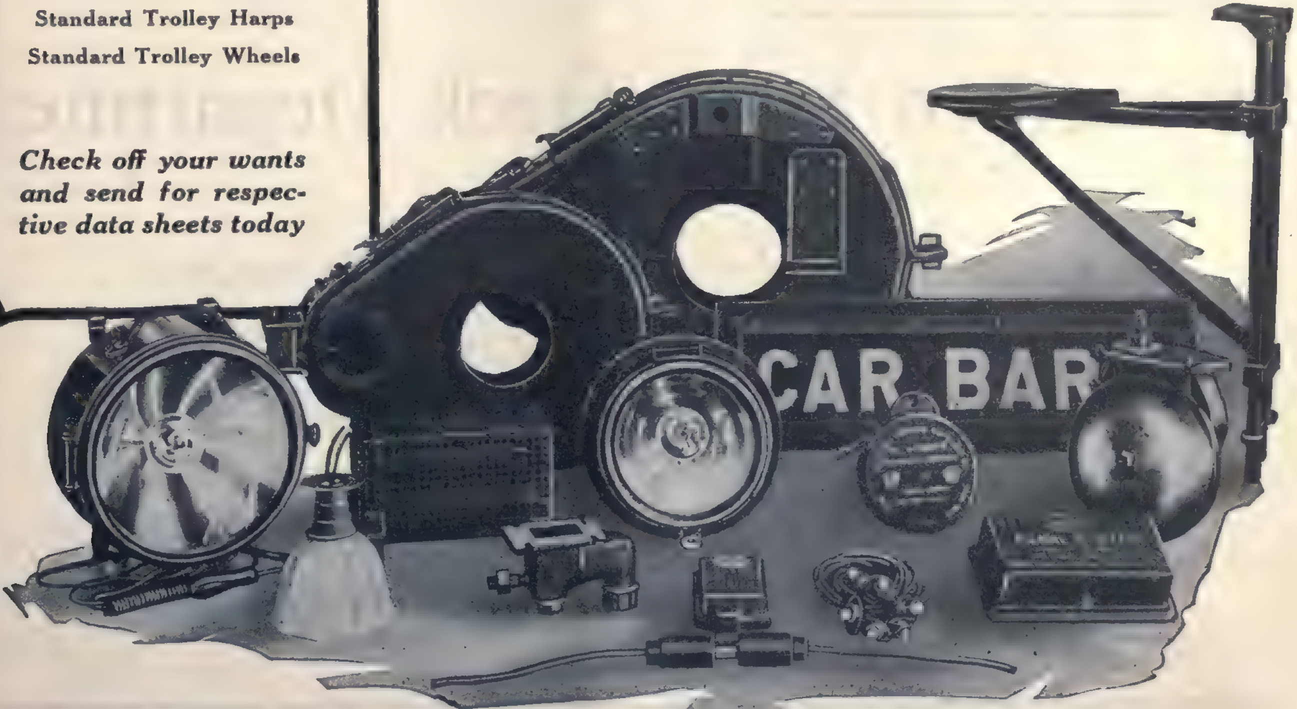

Carry an Ajax Portable Electric Arc Welder

SPECIFICATIONS

Weight—only 155 lbs.

Dimensions—18 in. x 28 in. x 36 in.

Capacity—333 amps. at 600 volts.
—200 amps. at 300 volts.

Control—Swichboard attached.

Equipment—Electrode Holders.
—Trolley Pole.
—Cables.
—Face Shield.
—Canvas Cover.

Write for circular and prices

It will pay you well to carry one or more of these sturdy little machines in your track department equipment. Light, rugged, easy to operate, inexpensive to maintain, the Ajax Electric Arc Welder is the most practical instrument ever devised for the maintenance of electric railway track. Its extremely high capacity at all operating voltages makes it especially valuable for accomplishing strong, deeply-penetrating welds under all conditions.

Strengthen Your Track Department
with
Universal Rotary Track Grinders
Atlas Rail Grinders
Reciprocating Track Grinders

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

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Atlas Railway Supply Co.
Chicago

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Modernize!
Pneumatize!

"Oh, Thank You So Much!"

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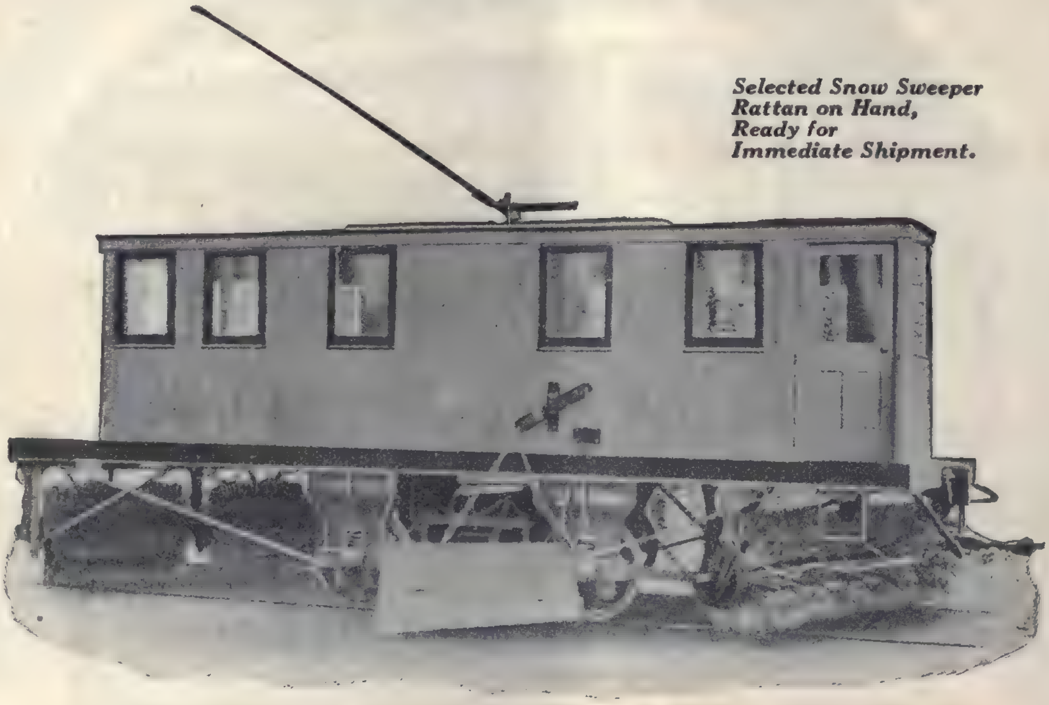

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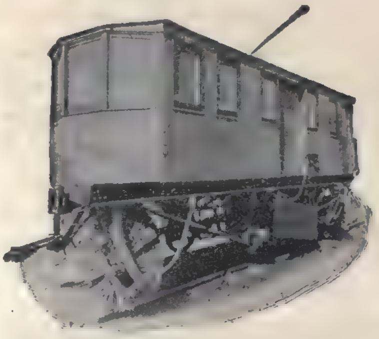

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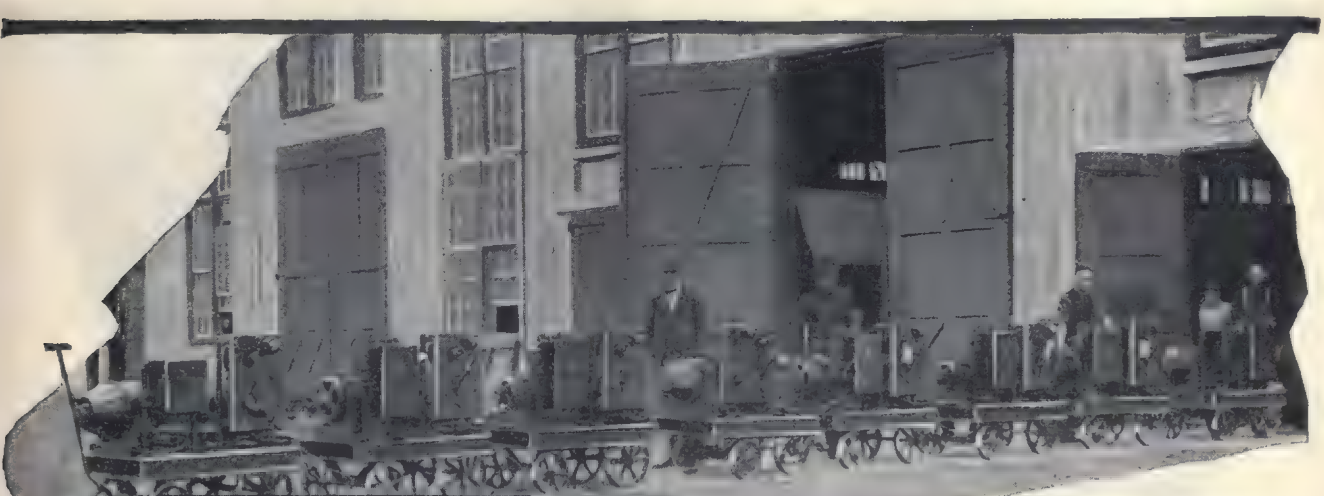

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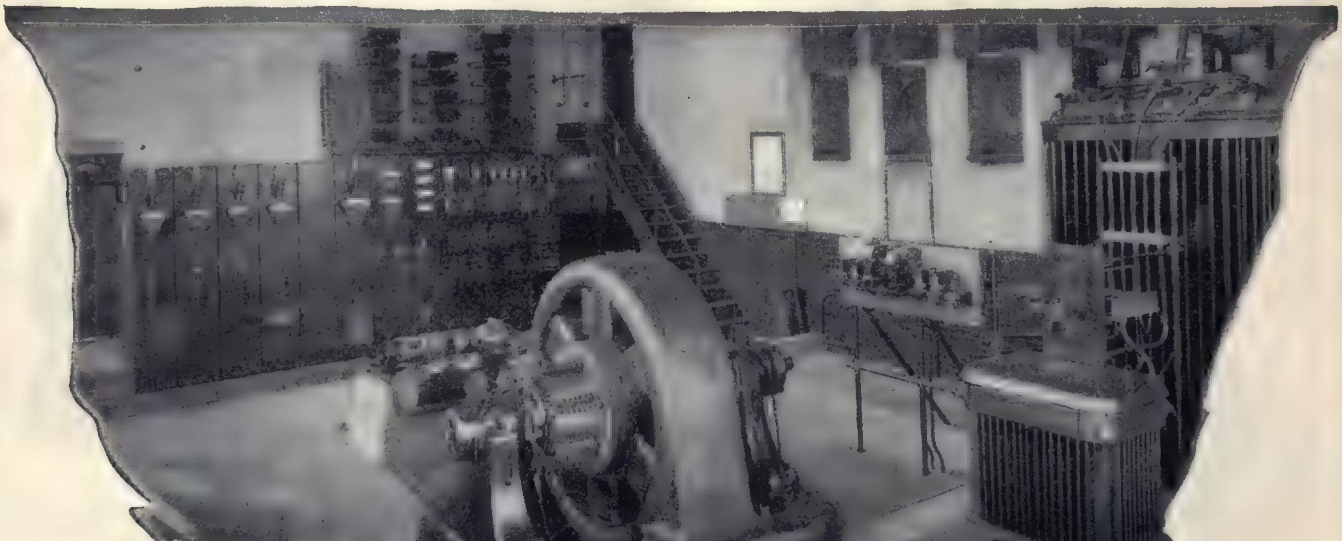

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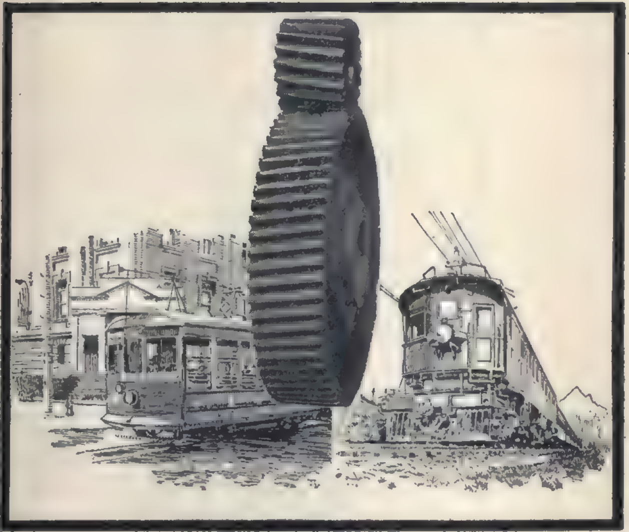

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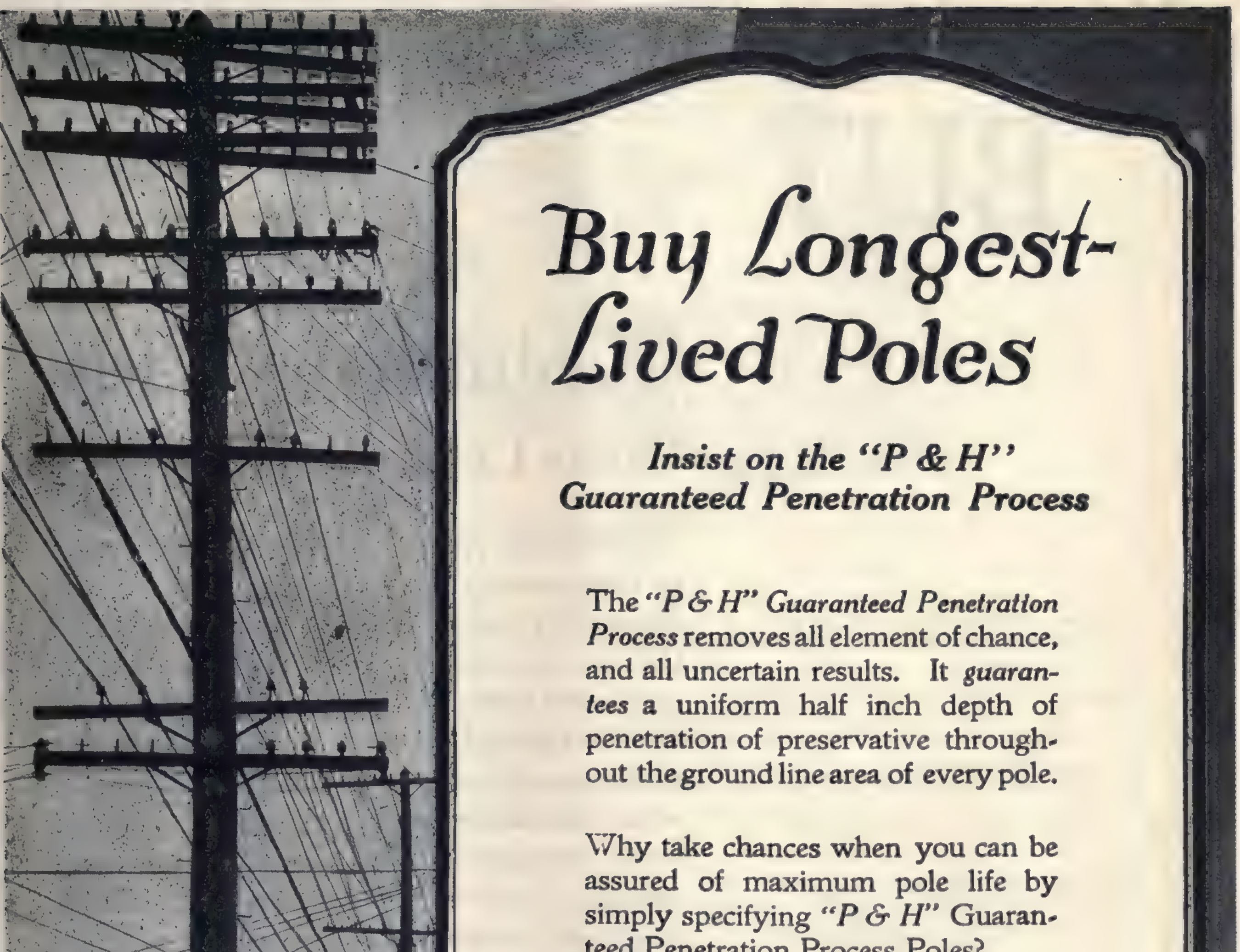

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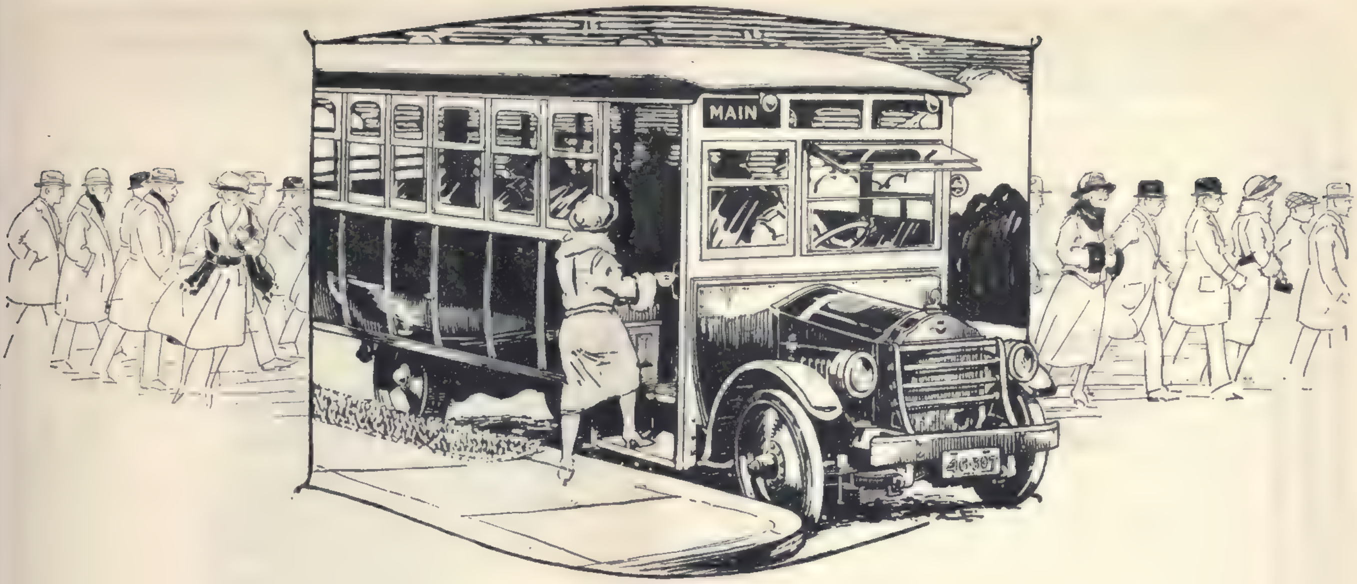

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Bulletin No. 5

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Volume 60 New York, Saturday, September 16, 1922 *Number* 12

Making the Most Out of the Convention

THE October convention is now but little more than two weeks off, and each individual who expects to attend should plan how he can contribute to the success of the meetings, both as regards himself and the meetings as a whole. One point has already been mentioned in these columns, namely, that the delegates should aim to be present at the scheduled time for opening so that each session can start promptly. A corollary of this plan is for each delegate to attend regularly the meetings of the association in which he is most interested, and a second corollary is that he should participate in the discussion so far as he is able.

The fundamental idea of any conference is the benefit which comes through the exchange of ideas and the new conceptions thereby brought out. A study of the programs for the various meetings shows many opportunities for constructive discussion, and unless advantage is taken of these opportunities the full benefit of the meetings will not be had. To understand the truth of this statement one has only to recollect the noteworthy information brought out on the floor of past meetings, notably, perhaps, of the Engineering Association, as well as the excellent discussion which followed the report last year of the committee on merchandising transportation of the Transportation & Traffic Association.

Executives of member companies will do well to impress upon their officers and staff the great advantages and benefits that will come from their attendance at and participation in the sessions of the various associations as they take place from day to day.

Now Is the Time to Settle the Coal Strike Permanently

THIS is the time to settle the coal strike, not the strike of this year, for that is over, but future strikes, with their great attendant loss to the public. These strikes occur so frequently as to indicate that the present system of settling them is not satisfactory, at least to the general public, which is vitally interested in having a continuous supply of coal. Consequently the discussion of this subject by Secretary Hoover at this week's chemical convention in New York is most timely.

In the Secretary's opinion, the present relationship of employer and employee in the coal industry constitutes a periodical national danger, as every quarrel threatens the welfare of 99 per cent of the community who are not parties to it. These quarrels center upon various rights claimed by employer and employee, but when these rights infringe upon the public right to a supply of a necessity like coal at a reasonable price, the dominant right is that of the public.

Much of the trouble will disappear, Mr. Hoover thinks, with more regular employment in the mines, and on this point he declares that our bituminous mines are operated much less continuously than those in England and Germany, and the public obviously pays the bill of this waste of labor and capital. He then points out that greater facilities of storage of coal among the larger users, particularly the railroads and the public utilities, would help greatly in overcoming seasonal fluctuations, while a co-operative system of marketing would get better car distribution, would decrease transportation, would enable the laying down of coal in storage at points of consumption, and would consequently give more regular operation with reduced working costs. The proposed coal commission has a great opportunity for constructive work in the interests of the public.

Mayor Couzens Scents a Conspiracy

JIM COUZENS, Detroit's Mayor, came up from the bottom. He ought to know labor. It is his proud boast that he has worked with his hands. That was a long time ago. He has had lots of time since then to forget many things. One of the things that he has forgotten is that labor by and large is ungrateful. Thus Mr. Couzens is found caterwauling about something that hasn't yet happened to him, but that may happen in the future. He is visibly perturbed. It is all about the trainmen in the employ of the Detroit Municipal Railway.

As Mayor he has treated the railway employees well. He says so himself. And the facts bear him out. He did not reduce wages when wages were generally reduced. He established a trial board to investigate all complaints against employees. All this and more he has done for labor. And now Mr. Couzens sees labor about to turn against him. The men on the municipal lines who were members of the Amalgamated when the Detroit United lines were taken over threaten to turn on Jim and bite the hand that has fed them. These same men bit the hand of the Detroit United on several occasions. Apparently, they did this because the Detroit United was a private corporation without a soul, that ground the men down so that the widows and orphans among its security holders might live in luxury. But that the men should want to do the same thing to Jim after he has done so much for them is too much. It can't possibly be so.

If it is so, then there is some deep mystery attached to it all. Is some agent of the lower regions surreptitiously at work among the men to stir them up? No. Is union labor preparing to repay a debt of human gratitude in the approved union way? No again! According to a public statement of the Mayor, a number of electric railways are in a conspiracy to stir up the men, embarrass his administration and discredit municipal ownership as a policy and if possible destroy it. Can you beat it? As Spoon River says, beware of the man who rises from one suspender.

Individual Railway Experiments with Joints Have Been Costly

APROPOS of the question of policy involved in the proposal that the American Electric Railway Association appropriate funds for financing the work of the committee on welded rail joints, it is being said, in opposition to the suggestion, that the industry or the companies as a whole are continually in actual service conditions making better experiments than the committee could make. In other words, the thought is expressed in some quarters that the companies should continue their individual efforts at testing joints in service in the manner which has long prevailed and which, so far, has resulted in this lack of knowledge in regard to the relative merits of the several types of welded rail joints which confronts the industry.

The individual experiment method has, more than any other single factor, been responsible for the lack of information which the committee on welded rail joints has disclosed through its preliminary study. So long as individuals experiment each for himself, without co-ordination of effort, just so long will there be a diversity of opinion as to the results of their experiments.

The co-ordination of such individual efforts has been one of the aims of the committee because it has been found that in no other way can the industry hope to learn the fundamental facts underlying the properties of each of the several joints which have more or less use today.

Even were such efforts co-ordinated through the committee, there remains the fact that years have been required to learn some facts about welded joints which proper and scientific tests, made beforehand, would have developed within a few months. No one would think of erecting an important building without testing the soil in advance, to be certain that the foundations will spread the load. But the electric railway industry has been blindly building tracks with joints of varying merit without any real advance knowledge of their ability to withstand the stresses which come upon them.

Surely, preliminary tests can and should be made to determine how welded rail joints may be expected to perform. That it is not possible, within reasonable cost, to make tests exactly under full service conditions is not a cause for rejecting the service test scheme as proposed by the committee, because some of the best scientific minds in the country have indicated their belief that tests which will give all necessary data can be made in the manner proposed.

Individual efforts have had their day and so far have principally caused expense entries on the debit side of the ledger account against rail joints. The records of one company show this clearly. A careful account of maintenance costs for 100 miles of modern track having an average age of four years gives significant information relative to the cost for joint maintenance as compared with total maintenance for the track, and also the cost for a particular joint which caused excessive expense. Had proper tests been made before this joint was adopted an expense of more than $100,000 could have been avoided. The records indicate that 65 per cent of the total maintenance expense for 100 miles of track was confined to 11 per cent of the mileage and all of the track producing this large proportion of the total expense was laid with a particular type of joint. No doubt similar records, if kept on other properties, would show similar results.

In any event, the way engineers know that their joint experiments, individually, have been costly affairs, and as a rule the engineers are rather reluctant to admit such facts for fear of adverse criticism. And small companies, of which the industry is mainly composed, cannot afford to make costly individual experiments. This throws upon the larger companies the burden of the experiments that are made individually.

It is believed that the problems requiring solution are not such that individual experiments, by the several large railway companies only, will solve them, at least within a reasonable period of time. If the problems are to be solved in time to avoid another decade of costly individual experimentation it seems clear that the efforts toward solution must be made by the research methods proposed by the committee and the industry as a whole should at once get behind the work as a matter of policy.

Can Wheel-Tread and Rail-Head Contours Be Co-ordinated?

A LIVE question before equipment and way engineers relates to the possibility of so designing wheel treads and rail heads that they will fit together when new and thus eliminate the ironing-out process. The use of rail heads with curved contours has been ardently advocated, and the Engineering Association has thought well enough of the idea to incorporate the curved head in the standards, as has also the British Engineering Standards Committee. Australia has the curved-head rail, too. The curvature of the head in these cases was selected to fit a partly worn wheel. On the other hand the French rails illustrated elsewhere in this issue in an abstract of the report of a paper by M. Gagné, of the Paris unified transportation system, have a plane head surface which he says is best because the cylinder is the best form for the wheel rolling surface. The action of the French Light Railways Association in adopting this feature was discussed editorially in the Nov. 27, 1920, issue of this paper, page 1106.

The curved-head rail is comparatively new, but the weight of the argument seems to be in its favor. It can easily be had if desired on a large scale, as its manufacture involves no complication in rolling. It is an open question at present as to whether the same arguments apply to the wheel. Some way engineers would like to get co-operation in this matter from equipment men in the form of a wheel tread with an enlarged fillet that would more nearly conform to the contour of the rail head. They believe that wheels as well as rails would wear longer if this could be done. Equipment men are reluctant to try out this innovation on a large scale as they believe that the results would not justify the bother and expense involved. They believe that the effect of curving the contour would be only transient. However, if some road or roads would try the plan on a large scale the experiment would yield valuable data.

At a recent Engineering Association committee meeting the opinion was expressed that the subject of interrelation of wheel and rail contact surfaces has never been scientifically studied. The suggestion which followed to the effect that a comprehensive committee be appointed next year to make an all-round study of the subject is commendable. Here is a chance for engineers within one industry to get together to settle a practical matter in a practical way. The committee ought to be appointed in due course.

St. Paul Utilities Co-operate on Stray Current Control

Results of Survey Conducted by Co-operative Committee of Utilities to Determine Results of Applying Remedial Measures Suggested by Bureau of Standards — Committee Also Studied Effects of Changes in the Distribution System and Elimination of Competitive Drainage in Underground Structures

By O. J. Lenmark
Power and Equipment Department, Twin City Rapid Transit Company, Minneapolis, Minn.

In 1917 the utilities owning underground structures in St. Paul, Minn., met to discuss electrolysis problems. As a result, the advice and co-operation of the Bureau of Standards was sought, and a joint investigation of return railway circuit conditions was made by the engineers of the several utilities under the supervision of E. R. Shepard, of the bureau. Later the bureau submitted recommendations looking toward improvement in the situation.

However, little was done in carrying out the bureau's recommendations until 1921, due to the unsettled condition incident to the war. In that year a working subcommittee, consisting of a technical man from each of the interested utilities, was appointed to carry out these recommendations and to determine the results.

The method of co-operating followed in St. Paul has proved very successful. Obviously, the problem of electrolysis is one that requires co-operation of all interested utilities. It is an engineering problem that is susceptible to analysis if constructive work is done by all of the parties concerned. The members composing this committee are technical men in the several operating organizations who are in constant touch with the changes in their systems which may affect the electrolysis situation. The problems are met fairly and squarely on the basis of facts, and opinions are formed from an unbiased standpoint. Any changes made on the various systems which result in a general improvement are approved by all the members of the committee before they are made permanent.

St. Paul's Electric Railway Distribution System

The St. Paul City Railway lines comprise approximately 170 miles of single track. The four principal sources of power supply are (see Fig. 2) the College Avenue substation, located at College Avenue and Wabasha Street; the Snelling substation, located at Snelling and University Avenues; the Hope Street substation, located at Hope and East Seventh Streets, and the Concord substation, located at Concord and Isabel Streets. The Concord substation was not in operation when the 1917 investigation was made.

Insulated negative feeders are installed in all of the substation districts, the system in the College Avenue district being unusually extensive. Complete data as to size, length, voltage drop, and current carried on the various feeders are given in the table, and the layout is shown in Fig. 2. This system of insulated negative feeders was installed to minimize electrolysis and it was highly commended by the bureau engineers at the time of the investigation.

In its 1917 report the Bureau of Standards stated that the St. Paul City Railway had installed a rather extensive insulated negative return system, used welded rail joints on a large part of its track and had generally good bonding on other sections. It was found that a number of failures on water and gas main service pipes and lead sheaths of cables, many of which had been attributed to electrolysis, had resulted from damage done prior to the installation of the four substations then in operation and were easily traced to conditions which had existed for a number of years previous. Many failures had occurred on University Avenue near Dale Street in the old substation district, where potential differences of 12 to 15 volts between water pipes and tracks had existed.

On the other hand, it was learned that practically no failures had occurred in some regions where conditions appeared to be most favorable for electrolytic corrosion, particularly in the Snelling substation district. Most of the failures which had occurred there were due to conditions which at that time no longer existed. In some cases where serious corrosion had taken place on pipes and the cause of such corrosion had been removed the pipe failed later under abnormal strain, or due to natural rusting of the weakened pipe. Galvanic action may also have taken place as a secondary action following electrolysis from stray currents. Some of the failures reported on gas service pipes were obviously due to their proximitiy to lead cable systems which, being drained, were strongly negative to the gas pipes. Others were in regions where the corrosion could not possibly have been explained by the action of stray currents.

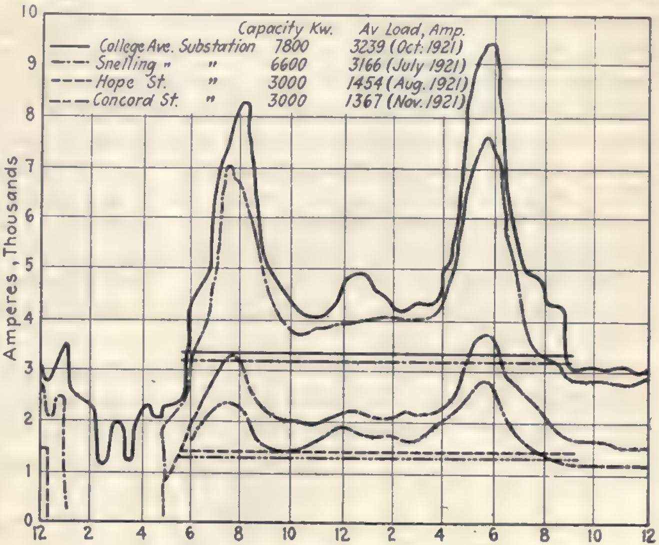


FIG. 1—SUBSTATION LOAD CURVES OF ST. PAUL CITY RAILWAY

The rails at Rice and Rondo Streets were found to be at unusually low potential, with the water mains strongly positive to them. To correct this condition it was recommended that more current be drawn from the tracks at the substation by decreasing the resistance between rail and negative bus, and that the negative feeder be moved from Rice and Rondo Streets to Tenth and St. Peter Streets, or that a tie be made on Tenth Street between the Rondo line and the tracks on Wabasha Street. The current on the Rondo Line could then be limited to give the best voltage conditions. The purpose of this change was to raise the potential of the Rondo Street tracks at Rice Street, where there existed a "potential sinkhole." This change would also divert more current to the Selby Street and University Avenue tracks, but should not change conditions appreciably along these lines.

It was also recommended, in order to reduce the potential gradient on University Avenue east of Hamline Avenue, that the 2,000,000-circ.mil cable on Chatsworth Street between University Avenue and Rondo Street be moved to the end of the Rondo Street line. The effect of this change would be to load that portion of the Rondo Street line west of Chatsworth Street then practically idle and correspondingly reduce the load on University Avenue. As this change would have only a minor effect on the potential gradient along University Avenue, it would not justify any great outlay of capital, particularly as the positive condition of the pipe on University Avenue can be reduced by other means.

The Bureau of Standards stated that it had consistently maintained that pipe drainage as a principal means of electrolysis mitigation is objectionable, the reasons for this being fully set forth in Technologic Paper No. 52. However, it had frequently recommended restricted pipe drainage to take care of residual effects which are always present, even where elaborate measures have been applied to reduce potential gradients on the tracks to a practical minimum. The potential differences found between the water mains and tracks in the Snelling Avenue district, though apparently not resulting in any failures up to this date, were stated to be too high to ignore and the suggestion was made that they could best be reduced by bonding the mains to the negative return system.

It had been found on the various cable systems that some were being overdrained, while there was insufficient drainage on other systems. To eliminate this hazard, the bureau recommended that means be provided to control and measure the current, and to equalize the potential between the various structures.

The Bureau of Standards' recommendations were made to cover conditions existing in 1917. After that year, however, several changes in the system have been made, such as the installation of the new Concord substation, some track extensions and a few minor changes in the cable and pipe systems. By 1921, when the work was taken up again, much preliminary testing became necessary to determine whether the changes recommended in 1917 still held. The committee then carried out on all the structures the suggested methods of mitigation, conforming to the general intent of the recommendations of the Bureau of Standards. A complete survey was then conducted along the lines of the bureau's survey of 1917.

The work consisted chiefly of the following items: (1) Preparation of load curves over a twenty-four hour period for the four substations, and determination of (2) potential drop and current flow in the negative return feeders, (3) potential gradients on tracks, (4) potential difference measurements; (5) current flow on gas pipes at numerous locations; (6) current flow in drainage cables connected between the various underground structures and the railway negative return system over a twenty-four hour period.

The loads on the Snelling and Hope Street substations were found to be about the same as in 1917, while the College Avenue substation load was considerably lighter due to the addition of Concord substation.

Of the eighty-four gradients which have been calculated, 25 per cent exceed 0.5 volt per thousand feet; and 6 or 7 per cent equal or exceed 1 volt per thousand feet. In 1917, they were 35 and 9 per cent respectively.

A few high gradients were found in the Hope Street district, where track repairs were being made when these measurements were taken, and it is believed that this temporary condition was the direct cause of these high readings. See Fig. 3.

As the raising of the potential at Rice and Rondo Streets would require the laying of one block of conduit

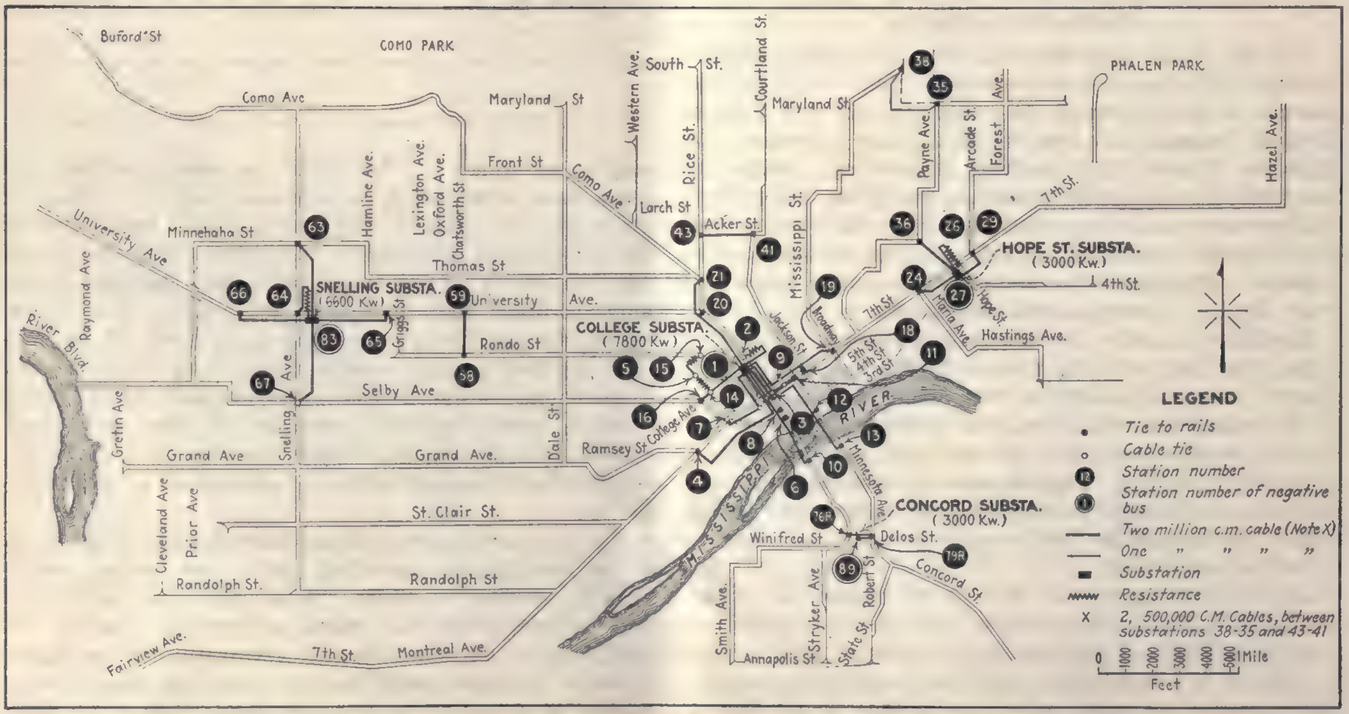


FIG. 2—DIAGRAM OF NEGATIVE FEEDER LAYOUT AND LOCATION OF PILOT WIRES WHICH TERMINATE IN COLLEGE AVENUE SUBSTATION

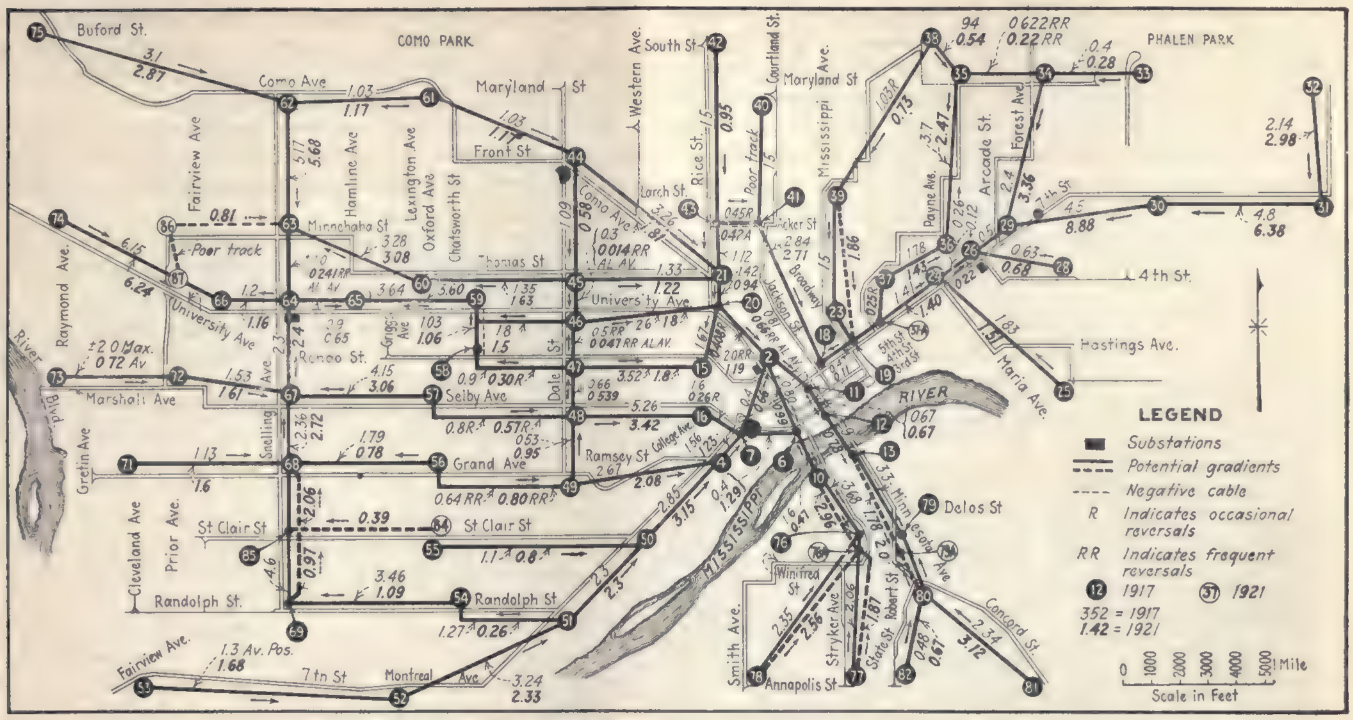


FIG. 3—TRACK POTENTIAL GRADIENTS

in a paved street and a 2,000,000-circ.mil cable, results essentially the same have been obtained by lowering the resistance in the feeder at College and Wabasha Streets to rails, and inserting additional resistance in the Rice and Rondo Streets feeder. At Snelling and University Avenues, the resistance in the feeder was reduced to lower the potential at this point in order better to balance the feeders.

In analyzing conditions from Fig. 4, it is seen that the feeders at University and Rice Streets, Rondo and Rice Streets and College and Selby Avenues are well balanced in good shape and that the water-main potentials are considerably improved.

As recommended by the Bureau of Standards, three drainage connections to water mains were installed in the Snelling substation district. These drainage connections have greatly reduced the positive potential differences between water main and rails. However, until it is determined whether or not joint corrosion is taking place, it will not be possible to regard conditions in this district as satisfactory. In order to determine whether or not joint corrosion is taking place, it will be advisable to make periodic inspection of the joints in the water main near the drainage points.

A complete electrolysis survey was made on the water mains in the Snelling Avenue and Hope Street districts. A number of measurements were also made in the vicinity of Rice and Rondo Streets. These are the districts where the pipes were known to be in danger. A comparison of the survey with that of the Bureau of Standards shows considerable improvement. This is due to pipe drainage installed in the Snelling Avenue district, and improved balancing of the negative feeders in the vicinity of Rice and Rondo Streets. A study of conditions in the Hope Street district revealed the existance of a positive area along the Hope Street and Maria Avenue car lines. This condition is unquestionably due to the high potential gradient on the East Seventh Street line and no doubt will be removed after track repairs are completed on this line.

As a result of the efforts made by the St. Paul City Railway and the various interested utility companies, the electrolysis conditions on the water system have been greatly improved. Since 1917, only three failures due to electrolysis have occurred. Of these three, one, in the Snelling Avenue district, was due to present conditions; one, in the College Avenue district, was due to the breaking down of the insulation of the negative-return system; and the third, in the College Avenue district, was due, undoubtedly, to conditions which no longer exist. Pipe failures, due to electrolysis, are now less frequent than formerly, and should become still less frequent in the future.

No attempt has been made to drain the distribution gas mains. However, a 16-in. cast-iron, high-pressure gas main which is not connected to the distribution mains is drained at University Avenue and Dunlap Street, as the potential difference of rails at this location was considered too high for safety.

In this connection, the possibility of using cement joints on a new 6-in. cast-iron gas main, which is to replace a 3-in. cast-iron main in the College Avenue district, was brought up before the sub-committee. The committee felt that the insulating cement joint, which preserves a high resistance over a long period of time, would improve electrolysis conditions on the gas mains in this vicinity very materially. Special precaution, however, would be needed in making these joints to prevent metal-to-metal contact between bell and spigot ends in the joint due to expansion.

It was further suggested that the service pipes in this insulated section be prevented from making electrical contact with other systems by the use of insulating joints within the premises served, as stray currents could enter from the water system through gas water heaters and other appliances with which it comes in contact, and injury would result to both the service and the section of the main to which it connects. In this specific case, it will be necessary to install a few cement joints on the cross mains which connect the insulated sections so as not to concentrate the potential at the insulated sections. On the cable systems care was taken not to overdrain the cables. To eliminate competitive drainage, only sufficient current was drained to prevent the cables from being positive to ground for a long period.

The sub-committee in its findings recommends:

1. That, in addition to moving the tie cable on Chatsworth Street between Rondo Street and University Avenue to the end of the Rondo line, it be extended to Selby Avenue. This would balance the University and Selby feeders in better shape and would greatly improve voltage conditions on the water mains on the University Avenue line.

2. That periodic current and potential measurements be taken at all drainage locations so that a check may be made of any change which might happen; and to investigate cause of change on the affected structure.

3. That close watch be made on the gas and water mains at drainage points to determine whether or not joint corrosion is taking place.

4. That a complete electrolysis survey of all underground structures be made at least every two years; and that tests be made in the substation districts during the intervening years.

Since the report of the sub-committee was submitted, the recommended change of moving the tie cable on Chatsworth Street to Dunlap Street and extended to Selby Avenue has been made; and the results of this change show improved voltage conditions on the water mains very materially along University Avenue.

POTENTIAL DROP AND CURRENT FLOW IN NEGATIVE CABLES

St. Paul, 1917–1921

All cables are 2,000,000-circ.mil unless otherwise noted. For location of the cables, see map.
Roman type = 1917 readings. *Italic type = 1921 readings.*

From Station Number	To Station Number	Cables Number	Distance (In Feet)	Volts 1917	Volts 1921	Amperes, All-Day Average 1917	Amperes, All-Day Average 1921	
	(a) College Avenue Substation District:							
2	1 Neg. Bus	15–109	134.5	8.3	*5.8*	156 (A)	*365*	
3	1 Neg. Bus	15–101 15–103 15–104	1,634	5.0	*2.94*	1,690	*991*	Cable Tie
4	1 Neg. Bus	15–102 (B)	5,265	8.9	*6.58*	336	*265*	
6	1 Neg. Bus	......	.....	8.8	*4.48*	.....	.....	
7	1 Neg. Bus	......	.....	8.6	*5.77*	.....	.....	
8	1 Neg. Bus	......	.....	8.0	*4.39*	.....	.....	
9	1 Neg. Bus	15–107	2,325	7.2	*3.4*	568	*277*	Cable Tie
10	1 Neg. Bus	......	.....	10.0	*4.7*	.....	.....	
11	1 Neg. Bus	......	.....	9.4	*4.78*	.....	.....	
12	1 Neg. Bus	15–105	4,422	9.5	*4.4*	395	*175*	
13	1 Neg. Bus	......	.....	9.2	*4.89*	.....	.....	
14 Neg. side of res.	Neg. Bus	15–106	1,161	4.82	*3.51*	760	*560*	
15	1 Neg. Bus	......	.....	9.0	*7.19*	.....	.....	
16	1 Neg. Bus	......	.....	7.2	*6.64*	.....	.....	
18	1 Neg. Bus	......	.....	8.8	*5.72*	.....	.....	
19	1 Neg. Bus	......	.....	8.8	*5.84*	.....	.....	
20	1 Neg. Bus	15–108	2.792	9.65	*7.79*	630	*520*	
21	1 Neg. Bus	......	.....	10.3	*9.39*	.....	.....	
7	3 Neg. Bus	15–101	1,962	3.6	*2.5*	336	*237*	
8	3 Neg. Bus	15–103	717	3.0	*1.75*	770	*453*	
9	3 Neg. Bus	15–104	689	2.2	*0.95*	590	*257*	
6	8 Neg. Bus	15–103	350	0.55	*0.098*	290	*51.9*	
10	6 Neg. Bus	15–103	1,933	1.46	.....	140	.....	
6	*10 Neg. Bus*	*15–103*	*1,933*	....	*0.479*	.....	*46.1*	
11	9 Neg Bus	15–104	505	1.7	*1.24*	630	*455*	
18	9 Neg. Bus	15–107	930	2.47	*1.29*	488	*257*	
19	18 Neg. Bus	15–107	1,441	0.39	*0.117*	50	*14*	*(Al. Av.)*
13	12 Neg. Bus	15–105	1,613	0.88	.....	100	.....	
12	*13 Neg. Bus*	*15–105*	*1,613*	.....	*0.78*	.....	*89*	
16	14 Neg. Bus	15–106	1,272	2.08	*2.79*	300	*406*	
15	5 Neg. Bus	15–106	1,278	1.9	.....	273	.....	
15	*14 Neg. Bus*	*15–106*	*1,278*	.....	*3.5*	.....	*178*	
21	20 Neg. Bus	15–108	1,142	1.36	*0.94*	220	*152*	
38	35 Neg. Bus	Tie	2,600 (C)	0.9	*0.54*	35	*19.2*	
43	41 Neg. Bus	Tie	2,550 (C)	0.37 (R)	*0.42 (R)*	15	*14.02*	
58	59 Neg. Bus	Tie	1,600	0.88	*1.06*	110	*120.6*	
79	76 Neg. Bus	Tie *(This tie removed)*	900	1.5	.....	110	.....	
	Drainage current from Tri-State cables						30	
	Drainage current from Tri-State cables						*18.43*	
	Drainage current from street railway cables						*18.9*	
	All-day average station load						4,567	
	All-day average station load						*3,239*	
	(b) Hope Street Substation District:							
24	27 Neg. Bus	29–103	1,879	2.98	*2.72*	292	*269*	
26	27 Neg. Bus	29–102	80	2.10	*2.85*	510 (A)	*306*	
29	27 Neg. Bus	29–104	854	2.55	*3.49*	550	*760*	
36	27 Neg. Bus	29–101	2,277	2.9	*1.7*	234	*139*	
	All-day average station load						1,586	
	All-day average station load						*1,454*	
	(c) Snelling Avenue Substation District:							
63	83 Neg. Bus	16–101	2,954	12.0	*14.6*	745	*920*	
64	83 Neg. Bus	16–105	100.5	11.1	*11.5*	165 (A)	*138*	
65	83 Neg. Bus	16–103	2,676	10.3	*9.94*	710	*647*	
66	83 Neg. Bus	16–104	2,541	10.4	*7.8*	750	*691*	
67	83 Neg. Bus	16–102	3,460	13.0	*18.03*	690	*968*	
	N. W. Telephone Company's cables						32	(A)
	N. W. Telephone Company's cables						*35*	
	Street Railway Company's cables						55	(A)
	Street Railway Company's cables						*22*	
	All-day average station load						3,149	
	All-day average station load						*3,166*	
Resistance in 16–105 was decreased at substation to balance feeders in better shape.								
	(c-1) Snelling Avenue Substation District:							
63	*83 Neg. Bus*	*16–101*	*2,954*	.....	*12.04*	.....	*760*	
64	*83 Neg. Bus*	*16–105*	*100.5*	.....	*10.58*	.....	*158*	
65	*83 Neg. Bus*	*16–103*	*2,676*	.....	*11.84*	.....	*768*	
66	*83 Neg. Bus*	*16–104*	*2,541*	.....	*9.65*	.....	*756*	
67	*83 Neg. Bus*	*16–102*	*3,460*	.....	*17.4*	.....	*893*	
	Northwestern Telephone Company's cables						*35*	
	Street Railway Company's cables						*22*	
	All-day average station load						*3,392*	
	(d) Concord Substation District (in service since Jan. 29, 1918):							
76-A	*88 Neg. Bus*	*33–101*	*816*	.....	*2.93*	.....	*667*	
79-A	*88 Neg. Bus*	*33–102*	*756*	.....	*1.42*	.....	*350*	
79-A	*88 Neg. Bus*	*33–103*	*739*	.....	*1.39*	.....	*350*	
	All-day average station load						*1,367*	

(A) = Measured at substation. (B) = Cables vary in size. (C) = 1,000,000 circ.mil cables.

Shop Notes from Quebec

While Local Maintenance Equipment Follows Standard Lines, the Practices Which Have Been Developed Show Originality and Adaptability

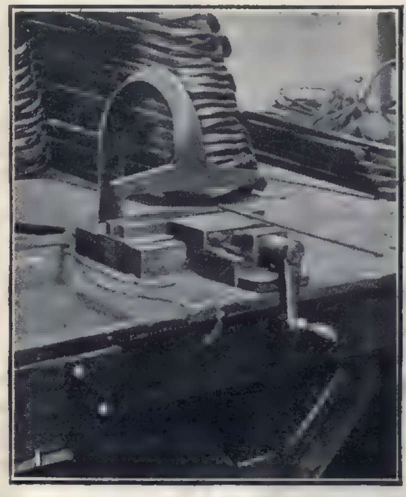
PETER QUINN, who is master mechanic of the Quebec Railway, Light & Power Company, has developed his shop with a view to the minimizing of labor in maintenance. His equipment is neither new nor elaborate, but what he has available he uses to good purpose. The general features of the Quebec system were outlined in an article in the issue of this paper for May 27, 1922. Some further items with particular reference to the shop follow:

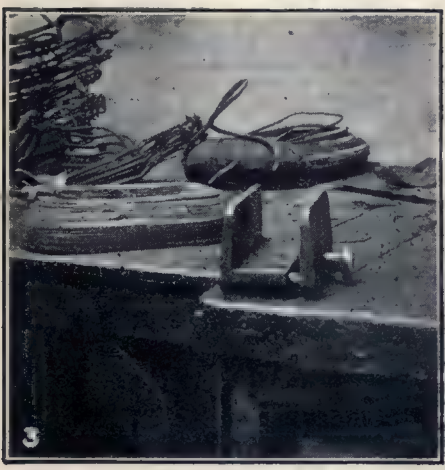
Mr. Quinn uses a home-made armature coil press which gives good results. (See illustrations.) It consists of a crank-operated bench vise with liners by means of which pressure can be applied to the straight coil side while hot from the varnish. To insure compactness of the coil and smoothness of the top and bottom surfaces a pressure bar is provided with a pedal mechanism for pulling it down firmly above the vise.

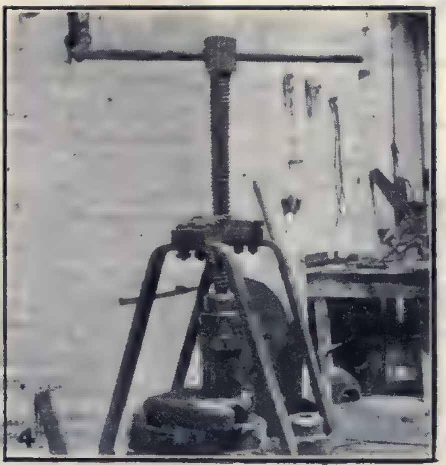
Another handy device is a rotating field-coil bench clamp for use in taping field coils. It is carried on a spindle which drops into a socket in the bench top. Still another device is a screw press for pressing motor bearings into and out of housings. The accompanying illustrations tell the story in these two cases.

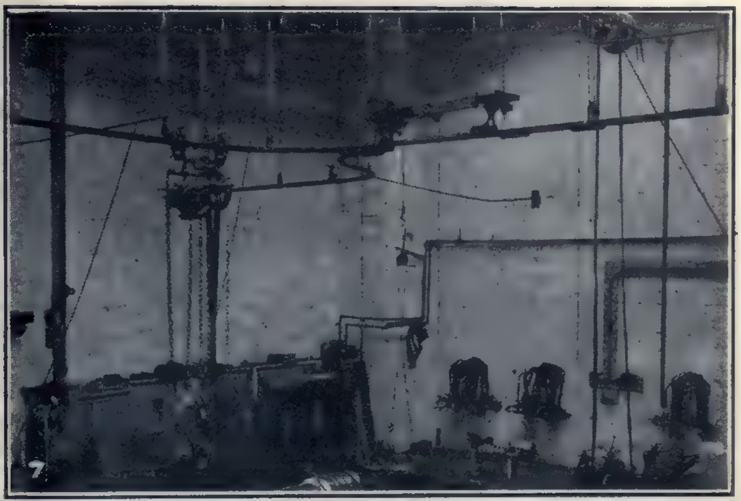
One of the greatest conveniences in the shop is a liberal use of trolley bar for the transportation of armatures, etc., from point to point. Two of the accompanying pictures were taken particularly to show the bar.

The bar is of cross-shaped section, the wheels of the trolley rolling on the horizontal surfaces, the upper limb being used for attachment of the supporting clamps. Switches in the bar permit shifting of the trolley from one bar to another. There are, of course, several successful commercial types of trolley bar which are suitable for this purpose.



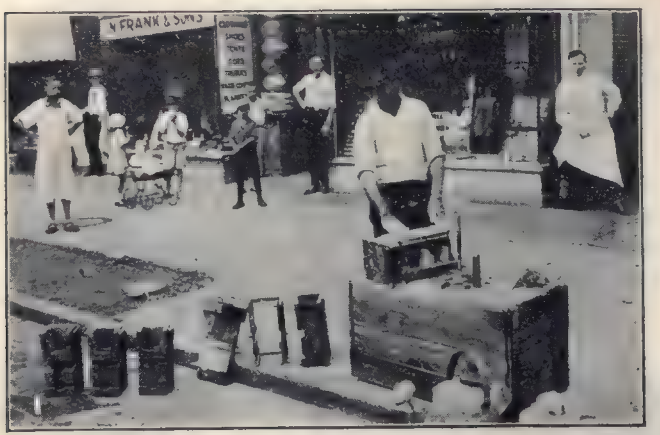


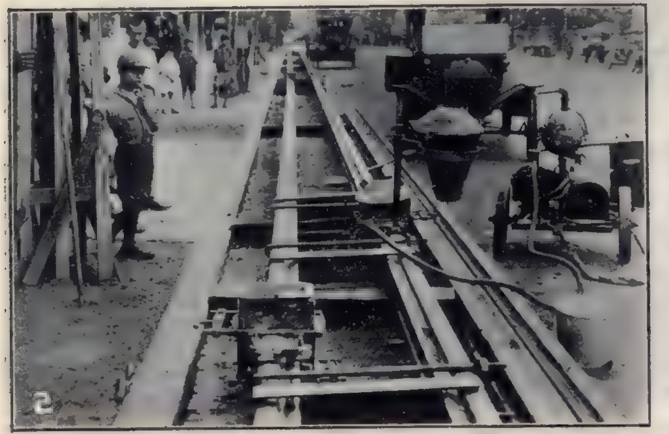


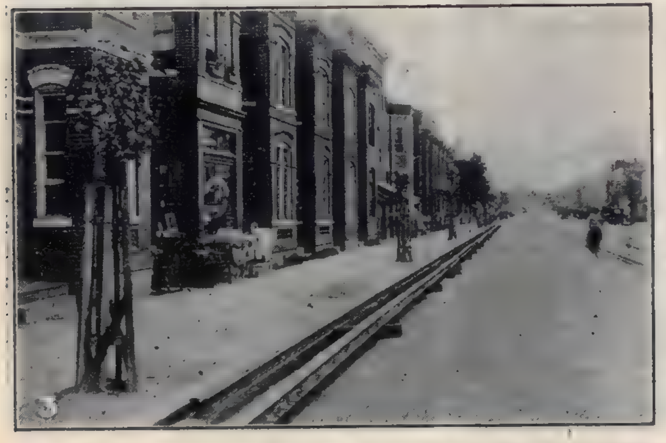


THE EDITORIAL CAMERA INVADES THE QUEBEC SHOPS

Nos. 1 and 2. This coil press turns out a smooth, compact coil.
No. 3. A rotating field coil vise facilitates taping.
No. 4. Press for inserting bearings in housings and removing them.
No. 5. Armature banding corner in the Quebec shops showing convenient belting connection.
Nos. 6 and 7. The trolley bar is a useful adjunct in the machine shop (left) and armature shop (right).







HANDLING AND WELDING RAIL SECTIONS IN WASHINGTON

No. 1—Ramming up self-luting mold box.
No. 2—Rails lined up parallel to each other on side of street preparatory to welding. One rail is being pre-heated.
No. 3—Two lengths of seven rails each at side of street after being welded. Each length 420 ft. long.
No. 4—Lifting seven lengths of welded rails into position alongside track.

Track Relaying Accelerated by Installing Pre-Welded Rails

Rails Were Welded at Side of Street and Transported to Position Alongside Track During Daytime, Then Installed in Permanent Location at Night

By C. S. Kimball
Engineer Way & Structures, Washington Railway & Electric Company, Washington, D. C.

During the course of some track relaying work the Washington Railway & Electric Company, Washington, D. C., recently adopted an economical method of installing and Thermit-welding new rails. This resulted in a considerable saving in time and cost as compared with the usual method of procedure and was accomplished without interruption to traffic.

The replacement consisted of 7,000 ft. of fourteen-year-old double track on H Street between North Capitol and Fifteenth Streets, N.E., with new 6-in. L.S. Co. 120-513 Trilby rail, a special rolled section, which is a modified A.E.R.E.A. rail made to conform to the special requirements of the conduit current distribution system installed in Washington. Normally three to four minute headways are maintained over this line, with one to two minute headways, lasting about two and one-half hours, during the morning and evening rush-hour periods. In addition to this service the heavy interurban cars of the Washington, Baltimore & Annapolis Electric Railway also operate over these tracks. It was, therefore, important that this frequent car operation be not interrupted. There were no adjacent parallel lines over which to reroute car traffic during rehabilitation, and the construction of temporary crossovers was entirely out of the question because of the difficulties and expense entailed by the conduit system.

The only time for carrying on this work without interrupting car traffic was between 1:30 and 5 a.m., during which period a half-hourly "owl" service was maintained by one car, which could be routed back and forth on one track, while the other track could be torn up. But relaying track over a conduit system takes longer than in the case of ordinary track for the following reasons:

1. Instead of simply spiking the rail to ties each rail must be bolted with four hook-bolts to the conduit yoke seats which support the rails at 5-ft. intervals
2. The yoke seats allow less room than ties for lateral adjustment of the rail.
3. The rails of a conduit system have to be surfaced much more carefully, by inserting steel filler plates between yoke seat and rail base (rather than tamping material under the ties, as in ordinary track) in order not to cause misalignment of the plow contact shoe, and hence possible breakage of the porcelain and cement insulations from which the conductor rails are suspended.

For these reasons, therefore, also because of the short, costly and ineffective periods of night labor, the work threatened to become unduly expensive and would have failed to keep pace with the progress of the preparatory work of removing the pavement.

Night labor costs, however, were greatly reduced and the speed of the work accelerated by laying the rails to be installed along the side of the street, parallel to the track, welding several lengths together during the day time and transporting them close to the edge of the track, then, during the early hours of the morning, removing the old rails and installing the new, welded lengths. If there was not time to weld the free ends of the welded rail lengths to the ends of the rails already installed, these joints were temporarily bolted, and Thermit-welded on another night. The new rails were temporarily bolted to every fifth yoke seat, or at intervals of 25 ft. Except where especially low joints occurred, surface plates were not inserted until later during a day period, when the temporary bolts were removed, the base of the rail wedged, plates inserted and the rail base bolted permanently to the yoke seat.

The number of rails per unit to be first welded together at the side of the street depended on the length of space uninterrupted by cross-streets along the curb adjacent to the place of installation. In most cases these welded rail lengths included three or four 60-ft. rails. In one case, on H Street between Twelfth and Thirteenth Streets, a pair of rail lengths was each comprised of seven rails making continuous lengths of 420 ft. each.

Before welding the rails at the side of the street each set of rail lengths were mounted on wooden cross ties cut in half, lined up parallel to each other and carefully surfaced by placing shims under the joints to be welded. The rails to be welded were kept in accurate lateral alignment by spacing the parallel rails evenly by means of three sections of I-beams, as shown in an accompanying illustration, which were cut to similar size. The rails were clamped together with eight bolts, four of which were clamped around the rail heads and four around the rail bases. Welding was then performed by means of the Thermit insert welding process. After the welds were made the welded rails were removed from the blocks and replaced by a set of unwelded rails.

When the time came to transport the welded rails to the edge of the track gangs working on four-men rail tongs lifted them over. In the case of the seven-rail lengths, twenty men on five rail tongs were used, with five men prying the rail with slot bars, making twenty-five men in all. Efforts were concentrated on moving only one portion of this flexible unit at a time by successively shifting one end, then the middle, then the other end half way across the street. By repeating these operations once more the total lateral shift of about 18 ft. from curb to track was completed. The two seven-rail lengths were thus shifted laterally in three-quarters of an hour. Each multiple unit was then in turn placed on pipe sections as rollers and tugged along parallel to the track by means of a Fordson tractor to a position next to where it was to be installed. In the future low dolly trucks, equipped with center wheels of slightly longer diameter to facilitate free changes of direction, will probably be substituted in place of the pipe sections. Only a few minutes were required the following night for seven rail-tong teams to place the 420-ft. rails upon the yoke seats and bring one end flush with the rail already installed by battering the other end with a loose rail.

This reconstruction work was in direct charge of George Mahoney, supervisor of construction, and under general supervision of H. Jackson, supervisor of underground lines. The welding gang included a welding crew and a grinding crew, both under one foreman. Duties were arranged as follows:

Welding crew (six men)—one man for making molds; two men for aligning, surfacing and clamping rail; two men for applying molds, preheating and pouring; one man for removing and cleaning up molds, also other cleaning up work.

Grinding crew (five men)—two men on one grinder,

5

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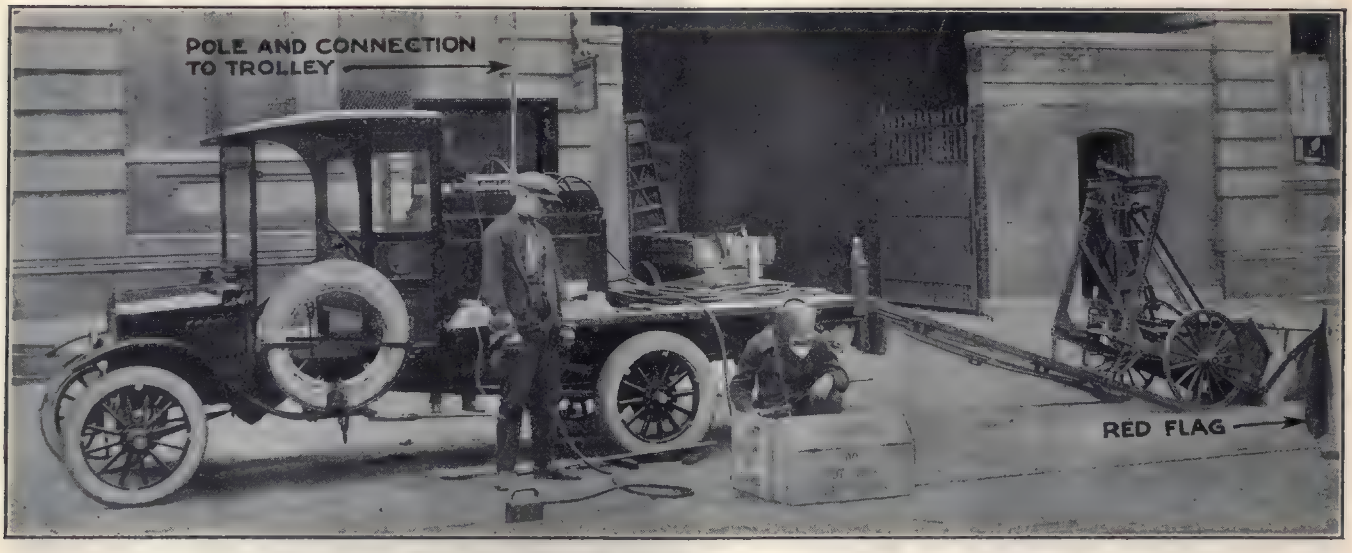
RAIL LENGTHS OF 420 FT. ARE HANDLED AS UNITS

No. 5—420-ft. length of rail partly lifted across street after being welded at curb.
No. 6—Two pairs of rails each welded from seven rail lengths in place alongside track for installation at night.
No. 7—Fordson tractor pulling 420 ft. of rail into position alongside track.
No. 8—Close-up of Thermit insert weld after installation.



HERE IS THE B. R. T. WELDING AND GRINDING APPARATUS READY FOR WELDING

grinding head of rail; two men on a second grinder, grinding weld at gage line; one man on small hand grinder, for finishing off grinding work.

COSTS OF WELDING RAIL JOINTS

	No. of Joints Considered	Labor Cost Per Joint	Material Cost Per Joint	Total Cost Per Joint
1 Welding	105	$2.88	*$8.13	*$11.01
2 Thermit supplies and equipment (not including materials actually used up in welding)	500	......	.55	.55
3 Manufacture of rail clamps and blocking for rail (for using special welding method described)	500	.41	.22	.63
4 Extra handling of rail (for using special welding method described). Putting rail on blocks and removing after welding	170	1.33	......	1.33
5 Grinding (estimated only, because work not completed at this time)	.....	1.00	.50	1.50

Practically speaking, should additional welding be contemplated the cost of Items 2 and 3 would actually be much lower, as these materials will still be serviceable for additional work at the completion of this job.

As the work progresses the unit cost of Items 1 and 4 will be considerably decreased as the welding crew becomes more expert in applying the new method.

* Had the new "center pour" Thermit insert weld been used the material cost of welding per joint would have been only $5.50 and the total cost of welding per oint $8.38.

The cost of Thermit-welding rail joints on this job, up to and including Aug. 8, 1922, was as shown in the accompanying table.

Taking the Arc Welder and Rail Grinder to the Job

This Automobile Welding Equipment Recently Assembled in Brooklyn Provides for Speed in Dispatching the Apparatus to the Line

ONE of the more recent developments in the use of the arc welder in the repair of defective joints and special trackwork has been along the lines of portability. The portability feature was necessary so that sites of emergency repairs could be reached more quickly than can be done under the customary scheme of hauling the individual welder to the job.

Under this scheme it is necessary to haul the equipment from job to job, which in turn requires careful routing of an automobile to haul the equipment about and later requires the additional haulage of grinding equipment. Where emergency arc-welding repairs are needed, this all consumes a great deal of time and there is considerable lost time due to delay because of the difficulty closely to follow the welding work with the necessary grinding work. The latter should be done immediately, if the best results are to be obtained in the repairs to cupped joints or to defective parts of special trackwork.

The automobile welding equipment shown in the accompanying views was assembled by the way and structures department of the Brooklyn Rapid Transit System, in order to facilitate the work of emergency repairs. The equipment consists essentially of a 1½-ton Ford automobile having an Olsen extension and carrying a body which was designed by the surface track division under the general supervision of C. L. Crabbs, chief engineer of way and structures.

Removed from its usual running gear, a Type "W" Rail Welding & Bonding Company dynamotor welding outfit is mounted on special supports on the truck body immediately back of the cab. There is space between the welder and the tailboard of the truck body for the special swing-frame-type grinding equipment, which has been developed in Brooklyn for the particular needs of grinding special trackwork and minor welds at joints.

B. R. T. EMERGENCY WELDING AND GRINDING OUTFIT READY TO MOVE

The sides of the truck are removable and are made to act as skids upon which to load and unload the grinding equipment. One of the views shows a block and tackle, temporarily installed for assisting in loading the grinder, but the outfit is now equipped with a small winch which better serves this purpose. The auto driver acts as a helper for the welder man, making a crew of two required to operate the outfit.

Inter-Operation Problems of Frankford Elevated

Use of Improved Features in Design Made Inter-operation with Present Equipment of Other Lines Impossible—Battery Control Adopted to Facilitate Use of Electric Couplers

BY J. N. DODD
Consulting Engineer

UNDERFRAMING AND EQUIPMENT

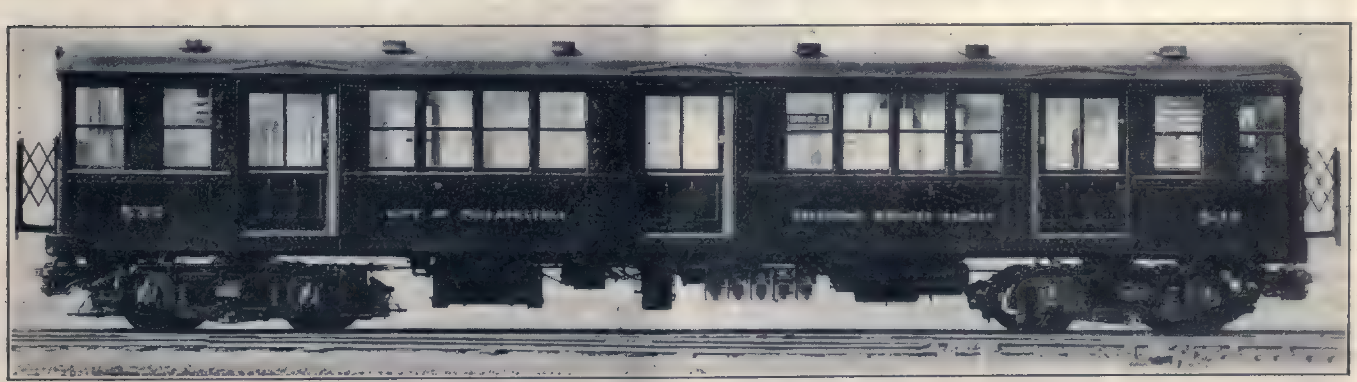
THE Frankford Elevated was built by the city of Philadelphia as part of an extensive system of municipally owned high-speed transit lines. In order to use it to advantage before the rest of the system is constructed, it was designed to be linked up with the Market Street subway and elevated line of the Philadelphia Rapid Transit Company, so that, assuming that a satisfactory operating contract could be arranged, the road would be operated as an extension of that line. The road is being equipped by the city, but even before the operating contract was signed by the company the engineers of both the company and the city were in close contact on all details of the determination of the equipment.

The existing cars of the Market Street line have line control. If the road was to be an extension, it would be necessary that the cars of either line should be able to run over the entire system. Satisfactory operation would be impossible if the Frankford cars were able to run only as far as the southern terminus, almost a mile from the center of the city, and the passengers were there compelled to transfer to the cars of the Market Street line in order to reach their destination.

Operation of the Frankford cars over only a portion of the Market Street line would be entirely impossible; that is, to have the Frankford cars run through the business center but no further. The interval between trains over that part of the line is already extremely close. For a portion of the rush hour there is a train every ninety-five seconds as far as Sixty-third Street, almost to the end of the line. It would be a physical impossibility to increase this service by the addition of the Frankford cars and still maintain a safe distance between trains. The only way to accommodate the Frankford cars in the subway would be for them to take the place of the Market Street cars when they enter the subway and to run to the end of the line and carry the Market Street traffic. It follows also that the track equipment of the Frankford line must be such as to accommodate the Market Street cars.

For this reason interchangeability of equipment also at first appeared desirable, at least to the extent that the new cars and the old should be able to run in the same trains. However, a brief consideration of the facts showed that this was impossible for a few years to come. The Market Street cars are equipped with a type of coupler which has given great satisfaction for many years on this as well as on many other roads. However, it is not automatic and it does not make the electric connections between the cars. It was realized that economy of operation demands an automatic coupler, which permits the cars to couple by impact; that is, by the mere bringing of them together. The coupler should also make the air-brake connection between the cars and simultaneously it should make the electric connections. Ordinarily it requires a considerably longer time to make the electric connections than the air, and some claim that three-fourths of the value of the automatic coupler lies in the electric features.

There is no modern coupler which can connect with cars on the Market Street line, and as no provision has been made for buying new couplers for the existing cars, operation of the two types of cars in the same train is an impossibility for some time to come. With



EXTERIOR SIDE VIEW OF FRANKFORD ELEVATED CAR this given as one of the conditions, the engineers felt free to consider carefully the advance which has been made in all details of car equipment to find out what was best without being bound by the requirement that the new cars should be able to run in the same train with the old ones.

Improved Brake and Other Equipment Adopted

The latest type of brake equipment has several improvements over the type on the Market Street cars. While the equipment on the old cars represented what was at that time the latest advances in the art, subsequent experience has shown the need of further refinements and additional features to meet the exacting requirements of modern rapid transit service. The new equipment has a much higher air pressure (and therefore brakeshoe pressure) for emergency application than has the old and a plentiful supply of air at this pressure, the purpose being to obtain the quickest possible stop when necessary. With the new equipment the brakes are applied automatically whenever the brake pipe pressure falls to a predetermined figure, whether this lowering in pressure is done designedly or inadvertently by the motorman, or whether it is due to leaks or even to failure of the compressor.

The control of the new brakes is such that in the event of failure of the electric control the brakes are controlled pneumatically without further action on the part of the motorman. It has many other refinements of greater or less importance. However, the control of the two types of brakes is radically different in that both cannot be run in the same train without abandoning the electric control. Electric control is such an important feature that its abandonment could not be considered.

The door-operating equipment has been improved so as to halve the operating cost and at the same time increase the safety. Operation has shown the need of an emergency system of lights which would be effective in case of failure of the power from the third rail. It was also desired to have the front and rear train marker lights supplied from a reliable source separate from the third rail so that the lights would burn even if the shoes should be broken off or the fuses blown. Adoption of any of these features would have made the operation of the two types of cars in the same train an impossibility.

It was felt that the improvements which could be obtained were so great that they should be adopted and that the ideal of uniformity of equipment be abandoned. This left the engineers free to adopt whichever type of control seemed best. The requirements that the cars be provided with emergency lights and with tail and marker lights energized from a source independent from the third rail meant that each car be equipped with a storage battery of large capacity. The control could be supplied from the same battery without increasing its size so that storage battery control would actually be a step in the direction of simplicity.

Reasons for Using Battery Control

The Frankford cars run in a subway where practically all the dirt is brakeshoe dust. This is very finely ground and is highly conducting. It enters all parts of the equipment and the breakdowns in insulation appear mainly due to this cause. Trouble from this source would be practically eliminated by the substitution of 30-volt battery control instead of 600 volts from the third rail. Experience has shown also that when a failure occurs with 600 volts it is usually so serious as to require cutting out the entire cars. However, with 30 volts when a failure occurs it can be localized frequently to a single circuit.

One source of danger which not infrequently occurs from a failure of this sort is when the breakdown is on the first car of a train. When 600-volt control is used such a failure necessitates running the train from the second car. In a subway this not only is difficult but dangerous as well. As pointed out above, failure of insulation is very unlikely on a battery circuit, and even if it should occur on the 600-volt circuit of the first car battery control would permit cutting out the motors and operation of the remaining cars from the first. It is an interesting fact that in the Interborough subway in New York all cars originally had line control. However, 500 of them have been changed over to battery control and the last 1,000 bought also have battery control. It is said that the reason for the change is the freedom from insulation breakdowns. On the Brooklyn Rapid Transit line no subway cars are equipped with line control.

Strong as these arguments were, they took a secondary place when consideration was given to the electric coupler. The automatic electric coupler is essentially a detail of the equipment wherein trouble from high voltage may be anticipated. It consists of a number of energized knobs or buttons projecting from a plate. The necessity for compactness requires that these be placed very close to each other. In this case there would be thirty-three knobs, many of them placed not more than ½ in. from each other. If the voltage is only 30, a creeping surface of ½ in. may be considered with equanimity. If, however, the voltage is 600, it cannot be so considered, especially if the surface is also apt to be damp and covered with iron dust. An electric coupler was desired. If an electric coupler was to be used, the control voltage used should be the lowest with which reliable operation of the control could be obtained. It is usually felt that this is about 30 volts, and this type of control was therefore selected.

To recapitulate: The existing cars were equipped with line control, and economy of operation would usually demand that the new cars be such as to permit operation in trains with the old ones. However, the determination to adopt safety features and details to reduce the cost of labor for operation made their use in trains impossible. Experience elsewhere made the adoption of battery control advisable and the decision to use the automatic electric coupler made this imperative.

Trial Locomotive for P.L.M. Railway

The Paris-Lyons-Mediterranean Railway (Cie des Chemins de fer de Paris à Lyon et à la Méditerranée) has ordered from the Société Oerlikon and the Société de Construction des Batignolles a trial locomotive for its approaching electrification. This will be placed in high-speed passenger service.

The locomotive will develop 1,840 hp. continuously at 50 m.p.h. and 2,400 hp. for one hour at 30 m.p.h. In starting the tractive effort may reach 47,500 lb. The maximum speed will be 68 m.p.h.

Regeneration will be provided for, and a train of 300 tons trailing weight will be held to not more than 25 m.p.h. by this means when descending a 3 per cent grade.

Richmond Problems Being Analyzed

Experts Consider Rerouting, Valuation and Traffic in the City of Richmond, Va.—Find Considerable Jitney Service in Non-Competitive Districts

THE traffic check just completed on the car lines in Richmond, Va., by the Beeler organization should give information of value in the solution of the railway problem there. The Virginia Railway & Power Company operates the street railway lines in Richmond under a number of separate franchises granted at various times and having different dates of expiration. Practically all these franchises specify a rate of fare of 5 cents, with six tickets for 25 cents and special workmen's tickets at further reductions.

The company has requested the city to grant a thirty-year blanket franchise to replace the various franchises under which it is operating. It seems, however, that the city can grant franchises only after competitive bidding, and the city's legal advisers have held that bids can be called for only after the company has surrendered its franchises or they have expired. As the company might be unsuccessful in bidding on the new franchise, it has been unwilling to surrender its present grants.

During the past several years the Richmond railway division of the company has been unable to cover operating expenses at the specified rates of fare, so the city suspended these rates and the company has been operating under a temporary rate of 6 cents granted by the City Council. The city government, in granting this relief, felt that definite action should be taken to provide a more stable basis of operation for the company. It was claimed that the division of expenses between the various physical and political divisions of the company was not being made correctly. The company produced a valuation which it presented as a basis for negotiations, requesting a fare to yield 8 per cent on the cost of reproduction as of Jan. 1, 1920. The city was opposed to acceptance of this valuation as it stood. In addition the city felt that the entire situation required an analysis.

To complicate matters still further, a strike of the trainmen last winter to combat a wage cut caused the growth of a competing jitney service. There was a partial boycott of the street cars by union sympathizers. The company fought the strike to a finish and is now operating with practically new forces. The business is now coming back. To curb the unfair jitney competition the city passed an ordinance restricting jitney operation to five definite routes which in general do not directly cover street car lines although they operate in street car territory. The jitney fare was fixed at 8 cents. Provisions for adequate bonding and insurance were included so that irresponsible jitney men would be forced out of business. The jitney operators contested this legislation and obtained a restraining injunction which was later dissolved, so that the city ordinance is now in effect. It has resulted in a reduction in the number of jitneys from about 500 to 100. Practically all the jitneys now in service are running on what is known as Route No. 1, which serves a high-class residence territory in which the car lines are a considerable distance apart. The railway for some time had an application before the Council to construct a car line in this territory, but met with much opposition from the property owners, so that the project was abandoned. In lieu of a car line the company has been willing to install a trackless trolley and operate it as a part of the street car system, at the same fare and with free transfers. The property owners have objected to this project also on the ground that the overhead wires would be a disfigurement.

In July of this year a bus line was granted a franchise to operate at an 8-cent fare over what is practically the same as jitney route No. 1, in the territory where the company was refused a permit for a trackless trolley. While the franchise has been passed by the Council and approved, it still remains open until bids are obtained and the franchise awarded to the successful bidder. Meanwhile the jitneys are doing a considerable business in this district. Manifestly a situation such as this is exceedingly unsatisfactory and should not be allowed to continue.

To have the full information before it to make a proper decision, the City Council, through Ordway Puller, chairman of the committee on streets, has engaged the Beeler organization to make a thorough investigation of the entire situation and advise with regard to the valuation, the efficiency of operation, the company's accounting methods and the car routing and service furnished in Richmond.

The valuation is being reviewed carefully to see if it is applicable to the present situation. This involves a check of the inventory and prices adopted, as well as an analysis of the theory on which the valuation was prepared. An audit of the books and records of the company is being made to determine their accuracy and also to find if the allocation of items between the railway and light and power departments, as well as between the geographical divisions, has been made properly.

Since it is probable that the routing, which was laid out a generation ago and has not been changed materially since, is not now adequate, a special study is being made to see if improvements can be introduced which will at the same time result in more efficient and economical operation. The service is being checked, since there appear to be inequalities that should be adjusted. The operating methods of the company are also being investigated. It appears probable that with a rerouting and the installation of modern methods the revenues of the railway can be increased and the operating expenses reduced. This should make it possible to earn a reasonable rate on a fair valuation, which is the result desired by both the city and the company.

A.B.C. of Commission Work

A LEAFLET on the methods of the Department of Public Works in Washington State, written in simple language, has been prepared by E. V. Kuykendall, director. It is entitled "Explanation of the Operation of the Washington Department of Public Works, Formerly the Public Serrvice Commission of Washington." It explains why the department was created, how rates are fixed, why inventory and valuation are made, how and why hearings are conducted, and other matters which might suggest themselves to one interested in knowing the practice of the commission. Under the heading "Our Responsibility" the pamphlet concludes as follows:

> The latent resources of our state are immeasurable. Our undeveloped water power vastly exceeds that of any other state in the Union. Our irrigable acreage will in future years support teeming populations. Capital is slow to put

investment in enterprises of low earning possibilities. Public utilities are the instrumentalities through which power must be developed and distributed for the reclamation of arid wastes and the operation of factories and industries soon to come. By a rash exercise of power we could drive utility investors from our state. We have sought in the performance of our duties to take a comprehensive view of our field of operation with forward vision. We who are charged with the responsibility of regulation must pursue the path of justice to the public and the utilities alike. Any other policy would not only violate our fundamental law but would also work untold injury to the progress and welfare of our state.

Track Grinder Warning

San Francisco Company Also Instructs all Employees in Accident Prevention—Other Safety Activities Carried On by the Company

THE Market Street Railway of San Francisco in its accident prevention work has adopted a plan of giving illustrated lectures to all newly employed trainmen who have been thirty days in the service. This policy has been established on the theory that the recently employed trainman is better able to understand, after thirty days in the service, the importance of conforming to the rules and regulations of the company, and these additional instructions impress him in the event that he thinks that he has mastered the duties of his position. Older employees who have shown a tendency to be neglectful or careless in their work are sent to these lectures, given by the claim agent.

TRACK GRINDERS IN SAN FRANCISCO AT NIGHT CARRY AN ILLUMINATED DANGER SIGN WITH RED LETTERS

Previous to attending the safety lectures, student trainmen are furnished with a booklet in which are graphically shown various types of accidents.

Safety bulletins and cartoons are posted on the bulletin boards in all carhouses; articles on "safety always" are published in the employees' monthly magazine, and every effort is made to keep the men enthused in their accident prevention work by displaying on the bulletin boards the monthly records of each carhouse compared with other carhouses on a car-hour, car-mile and passengers carried basis.

While the company does not maintain a safety committee among its employees, each employee is taught to consider himself a safety committeee member of one, and he is urged to present suggestions which if placed in effect might reduce accidents. At all times employees of the company are confronted by the company slogan, which is "Care; Comfort; Courtesy."

Accidents are investigated by the claims department regardless of whether claims are filed, so that all available information will be in the hands of the operating department when it endeavors to determine the question of responsibility.

The co-operation of the public is sought in accident prevention by utilizing the windows of the cars and backs of transfers for printed matter. Illustrated lectures under the auspices of the company are given to school children, for it is realized that they are the safety missionaries in the home, and the claim agent instructs boy scouts on how to assist in safety work.

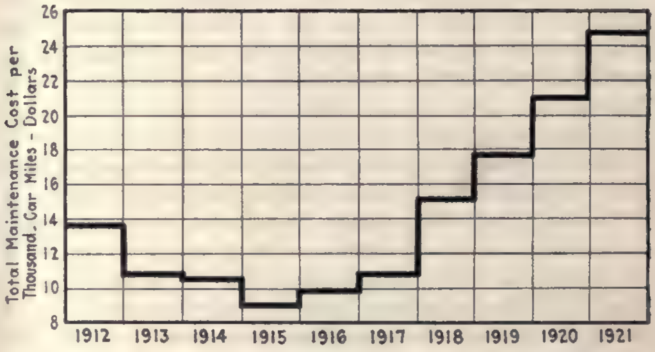
Almost twenty-five thousand illustrated booklets, titled "For Humanity's Sake; An Appeal to Automobilists for Safety," have been distributed to automobile owners throughout the city, and accident prevention placards published by the company and circulated under the name of the San Francisco Safety League have been placed in garages and stables.

The accompanying engraving shows an illuminated danger sign recently devised which is now being placed at night on track grinders, welding machines and concrete cutters when they are standing on the street. The sign is lighted by ten red incandescent lamps and the lettering is 6 in. high, making the word "Danger" visible for a considerable distance.

Maintenance Figures in Memphis

IN THE series of sixteen charts giving ten-year records of Memphis maintenance statistics, published on page 262 of the issue of this paper for Aug. 19, there is an error in the position of the decimal point in the chart showing total maintenance cost on a car-mile basis. This chart, in lower right-hand corner of the former group, has been corrected and is reproduced.

There was also an error in the figures on renewal and reserve expenditures in the large table on page 264 of the same issue. The figures given in the article were for all departments. The corrected figures on the mechanical expenditures, together with the renewal and replacement reserve and total balance reserve, which were given correctly in the table, are published below:



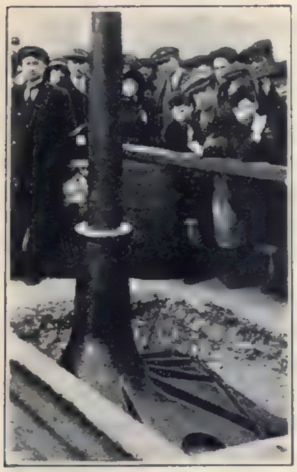
MAINTENANCE COST FOR TEN YEARS IN MEMPHIS

	Month of December 1921	Month of December 1920	Year to Date 1921	Year to Date 1920
R. & R. expenditures (mechanical department only)	None	None	$22,806.86	$10,938.51
R. & R. reserve (all departments)	$7,841.66	$3,263.00	45,634.35	51,950.50
R. & R. total balance reserve (all departments)	....	....	234,049.54	179,920.06

Equipment and Its Maintenance

Short Descriptions and Details of New Apparatus of Interest to the Industry. Mechanical and Electrical Practices of All Departments

Solving a Difficult Situation in Pole Setting



CONSIDERABLE difficulty was experienced in spanning Edinburgh's north bridge with overhead wires for electric operation. A specially cast base for anchoring the poles stretches across a brick arch of the bridge carrying the entire weight on two steel girders at the end of the casting. The accompanying illustration shows one of these bases in position on top of the arch ready for concreting in. A very substantial construction is thus provided.

Gasoline Rail Car Operating Cost

THE Alabama, Tennessee & Northern Railroad, Mobile, Ala., is operating one gasoline rail car between New York and Silas. The one-way distance is 53.5 miles and the car makes one round trip each day, or a total daily mileage of 107. A scheduled speed of 25 m.p.h. is satisfactorily maintained, according to a statement by J. T. Cochrane, president, who also remarks that the car is pleasant to ride in and quite popular with the patrons of the railroad as there is very little vibration or noise. It will start easily on any grade on the line and it gets away as quickly as an automobile without undue noise, jerking or other discomfort.

By accurate records kept during the thirty-one days of May the car was operated 3,317 miles, an average of 107 miles per day. The gasoline consumption was 390 gal., costing $95.18, and the oil consumption 13 gal., costing $4.94. This is a cost for gasoline and oil of slightly over 3 cents a mile. Mr. Cochrane figures "that the maximum cost of handling this car, including wages, cleaning, etc., will not exceed 15 cents per mile."

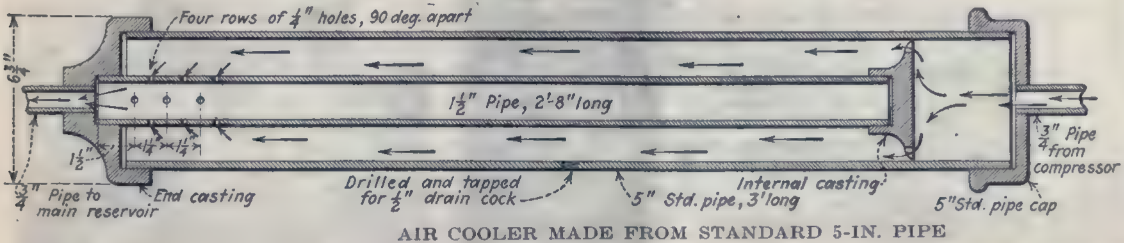
The car used was manufactured by the Indiana Truck Corporation, Marion, Ind. The body is arranged for pay-as-you-enter one-man operation and seats twenty-nine passengers. A toilet has been provided just back of the driver's seat. The chassis is mounted on a double truck at the front with single-drive wheels at the rear. The transmission includes four speeds forward and four speeds reverse. Brakes are provided on all wheels, the rear brakes being of the band type, while those on the front wheels brake directly on the wheels.

Air Cooler Made from Standard 5-in. Pipe

THE cars of the Cleveland Railway are being equipped with air coolers made from a 36-in. section of standard 5-in. pipe. Its purpose, of course, is to be inserted in the air line between the compressor and the main reservoir to cool the air sufficiently in passage so that all excess moisture will be dropped. The warm air, on being received from the compressor, enters the cooler and is deflected by a baffle so that it follows along in the space between the wall of the 5-in. pipe and another internal 1½-in. pipe concentric with it. In this way the air is kept in contact with the larger pipe where the cooling effect is obtained. The air leaves through twelve ¼-in. holes placed in the opposite end of the inner pipe. Accumulated moisture is drawn out of the outer pipe through a drain cock in the bottom of the cooler.

The only special castings required are the internal baffle and the cap on the reservoir end of the cooler. Both of these parts are threaded to receive the inner 1½-in. pipe. The simplicity and ruggedness of this device can be seen in the accompanying photograph, while the line drawing gives the details of construction and shows the path of the air as it passes first through outer portion and then leaves by the center pipe.

Terrence Scullin, master mechanic of the Cleveland Railway, is making the installation.



AIR COOLER MADE FROM STANDARD 5-IN. PIPE

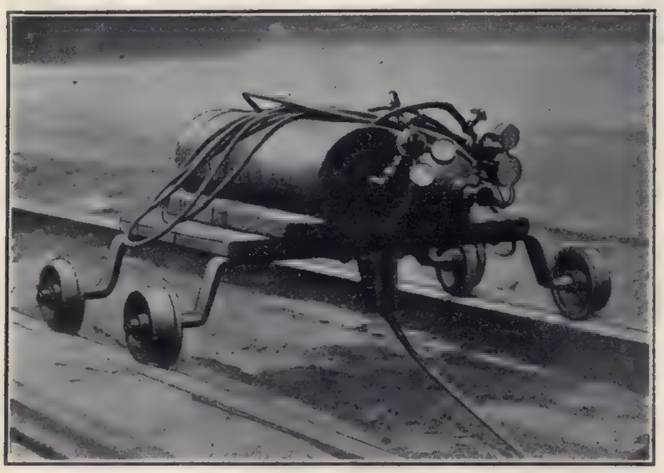
The line cut shows the details of construction of the air cooler. End castings and an internal baffle are the only special parts necessary.

The halftone illustration shows the air cooler, made from 5-in. wrought-iron pipe, which is being installed on the cars of the Cleveland Railway.

Truck for Oxyacetylene Tanks

IN CONNECTION with its track reconstruction this year the Brooklyn Rapid Transit Company has made considerable use of oxyacetylene torches for cutting the ends of the rails or burning the nuts off the bolts in the plates.

The accompanying illustration shows the manner of mounting the gas tanks on a small home-made truck so that they can be easily moved around on the job by the same man who does the burning with the torch. It will be seen that the truck is equipped with a "T"-shaped handle so that the man can pull it after him when he goes from one rail joint to the next. When it is desired to move the equipment from one job to another it is carried either on a heavy motor truck or in a car.



GAS TANKS MOUNTED ON TRUCK

Pressing Wheels Off Without Disturbing Gears

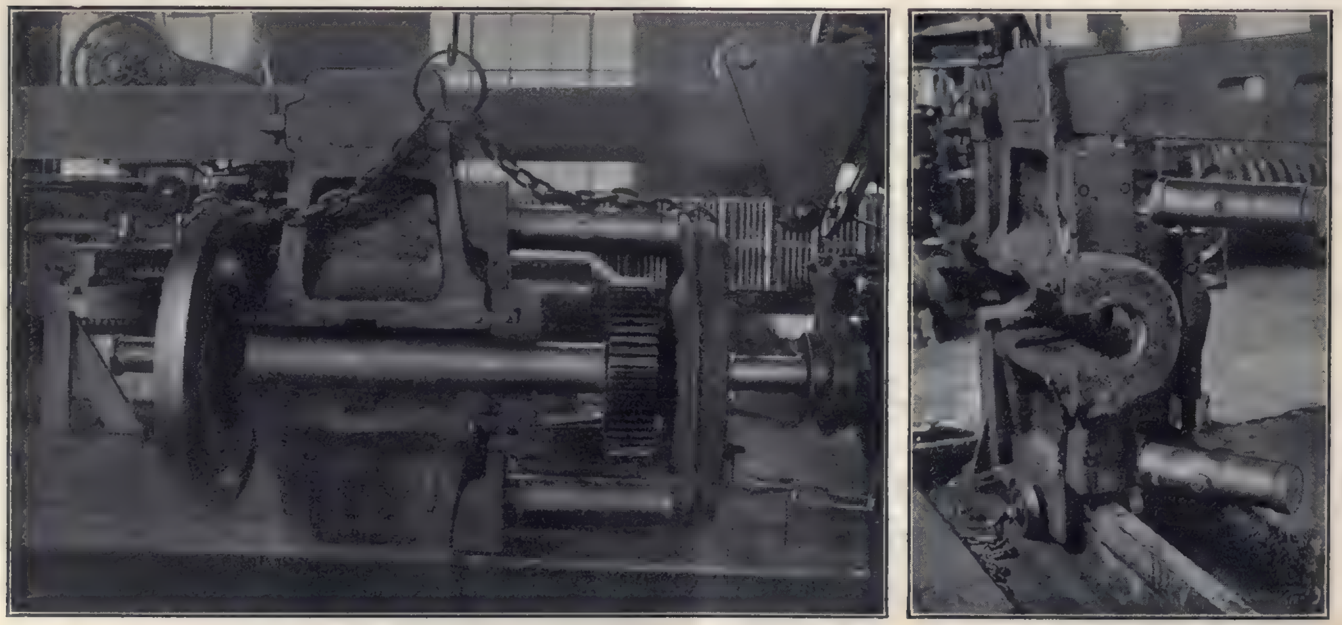
THE attachment of two cast-iron blocks to the traveling head of the wheel press in the shops of the Northern Ohio Traction & Light Company has made possible the removing of wheels from the gear end of an axle without disturbing the gear. These blocks act as seats for the two cylindrical spacing blocks that bear against the wheel rim. By mounting the spacing blocks on arms and hinging them to a post bolted to the back of the traveling head, they can be easily swung and held into position. They are also adjustable for different wheel diameters. Demounting the wheel adjacent to the gear on a wheel press equipped with these home-made devices makes the process little different from pressing off the one on the opposite end of the axle.

New Type Trailers for Toronto

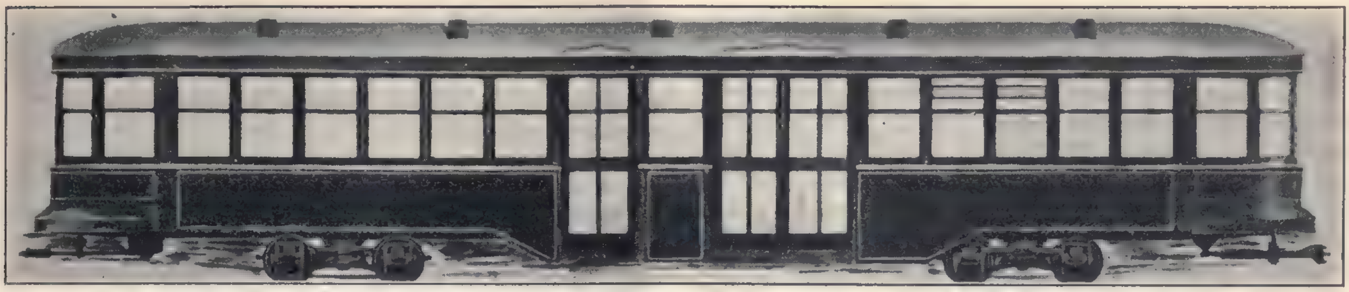
AS ANNOUNCED in the Rolling Stock columns of this paper in the issue for Aug. 19, 1922, the Toronto Transportation Commission has placed an order with the Canadian Car & Foundry Company., Ltd., for 100 trailers and fifty motor cars of the Peter Witt type. Some additional details regarding the construction of these cars are now available.

An accompanying illustration shows the design of trail car adopted. This is approximately 49 ft. over bumpers and differs from the trailers already in service in Toronto in the arrangement of the door openings. The new trailers have three doors near the center, one pair forming a double opening to the right, with the single door opening at the left. The door at the left is always used as an exit door and the door at the extreme right always as an entrance door, but the center door may be used either as an exit or entrance as traffic conditions warrant.

Inside the car at the center door is a movable barrier. When the conductor wishes to have the door used as an exit, the barrier is swung at right angles to the center of the car. The passengers in the forward part of the trailer can then file past the conductor, pay their fares and secure transfers as they leave without interfering with the unloading of passengers in the rear of the car who have previously passed the conductor on their way to the seats at the rear. When the barrier is swung along the center line of the trailer, the door can be used as an entrance to load the front of the car.



AT LEFT, TRAVELING HEAD OF PRESS FITTED FOR DEMOUNTING WHEEL WITHOUT PRESSING OFF GEAR. AT RIGHT, THE HINGED SPACING BLOCKS CAN BE EASILY BROUGHT INTO USE



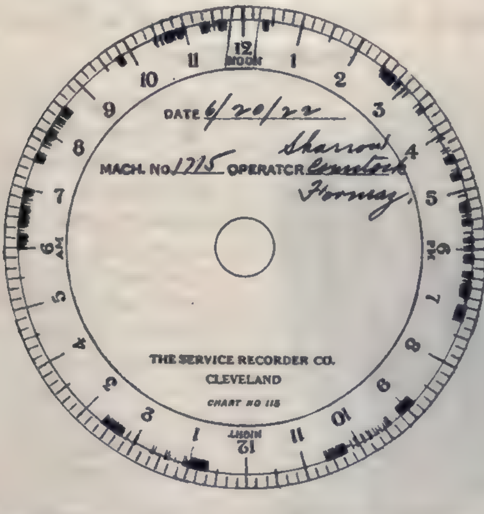
New Type Trailer for Toronto

This arrangement of openings was devised by G. W. Harvey, assistant general manager, to assist in quick loading and unloading at heavy traffic centers. When the car is operating in a district where the majority of passengers are boarding, the center door will be used as an entrance, and when the trailer enters an area in which the majority of passengers will alight, the conditions are reversed. The conductor's station is at the center of the car between the center and left-hand door.

The fifty motor cars, which are also being built by the Canadian Car & Foundry Company, Ltd., are of the Peter Witt type, but have some special features. They are smaller than the cars now in operation in Toronto, being but 47 ft. long as compared with 52 ft. for the present cars. The motor equipment will be of less capacity and they will not be used for hauling trailers as are the present cars. Provision is made so that the cars can be operated either as one- or two-man cars. The front vestibule is divided by curved barriers, so that the cars can be converted into one-man pay-as-you-enter, or one-man pay-as-you-leave as desired. Normally, they are intended to have the conductor placed in the center of the car.

Graphical Record of Tower Wagon Trips

THE accompanying illustration shows a record of the number of calls, the time taken to reach the point of trouble and the time consumed for making repairs taken on an emergency tower wagon used by the city of Detroit, Department of Street Railways. The record is made on a meter manufactured by the Service Recorder Company, Cleveland, Ohio.



Graphical Record of Operation of Emergency Tower Wagon

The mechanism consists of a clock driving a record on which a small marker makes an impression when the tower wagon is in operation. No ink is used, or rather the ink is "built in" to the record form. The meter pendulum which records the operation is extremely sensitive and the record is made by the rocking of the tower wagon while it is in operation. The meter can be mounted in any convenient location and can be padlocked so that the record cannot be tampered with. After each day's run records are removed for inspection and tabulation of data. The idea of using this method to form a graphical record of the operation of emergency tower wagons was originated by E. M. Gould, electrical engineer for the city of Detroit, Department of Street Railways.

Salt Mine Waste Used for Track Ballast

SOME TIME ago the Cary Salt Company of Hutchinson, Kan., donated a large quantity of waste product to the Hutchinson Interurban Railway to use as it saw fit. To make use of this material, the railway equipped an old stone crusher with a Westinghouse 323-A railway motor, together with the controller and necessary grid resistors. Through the use of this crusher the waste product was transformed into 2,000 cu.yd. of ballast at approximately 90 cents per cubic yard. The ballast was used to pave the company's right-of-way. The original crusher had a normal capacity of 2 cu.yd. per hour at 450 revolutions. Through the use of the railway motor, the speed was increased to 1,000 revolutions and the capacity of the crusher to 5 cu.yd.

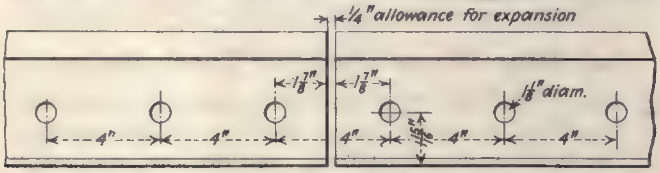
Railway Motor Used to Operate Stone Crusher

The current for operating the crusher was obtained from the trolley wire and the circuit was completed through a wire attached to an old brakeshoe which gave contact with the rails. The crusher was moved from one place to another by means of a cable which was hooked to one of the regular service cars of the company.

British Adopt Curved Head Rails

THE British Engineering Standards Association (formerly the Engineering Standards Committee) has recently issued its report No. 2, 1922, covering British standard specifications and sections for tramway rails and fishplates, revised March, 1922. Perhaps the most interesting feature of this report is in the adoption of the curved head (convex tread contour) for these rails. It will be seen from the illustrations that the head is formed by the curve of 9-in. radius which is connected to the gage side of the head by a fillet of 5/16-in. radius. This head curve radius is sharper than that used on either the American or Australian sections. The tapered web, similar to that of the American sections, is used in two of the new sections, but a straight web, ⅝ in. thick, is adopted for the heavy 7-in. section, and it will be noted that the 112.9-lb. section has a base 7 in. wide while the 103.7-lb. section has a base 6¾ in. wide. All told, there are now only four standard sections of varying weights with their accompanying guard rails, making a total of eight standard rails for tramways.

The angle of the gage side of the head is set at 7 deg. instead of the 5 deg. found in the American standard sections. The width of the head is the same for all sections, viz., 2⅛ in., which is practically a continuation of the British practice in adhering to comparatively narrow rail heads and wheel treads, in contrast to American practice, which tends towards wide rail heads and wheel treads.



STANDARD DRILLING FOR BRITISH STANDARD GIRDER RAILS

QUALITY AND CHEMICAL COMPOSITION OF THE STEEL

	Bessemer Process		Open-Hearth Process	
	Acid Per Cent	Basic Per Cent	Acid Per Cent	Basic Per Cent
Carbon	0.50 to 0.60	0.45 to 0.55	0.60 to 0.70	0.60 to 0.70
Manganese, maximum	1.0	1.0	1.0	1.0
Silicon, maximum	0.10	0.30	0.10	0.30
Phosphorus, maximum	0.075	0.08	0.06	0 06
Sulphur, maximum	0.07	0.07	0.06	0.06

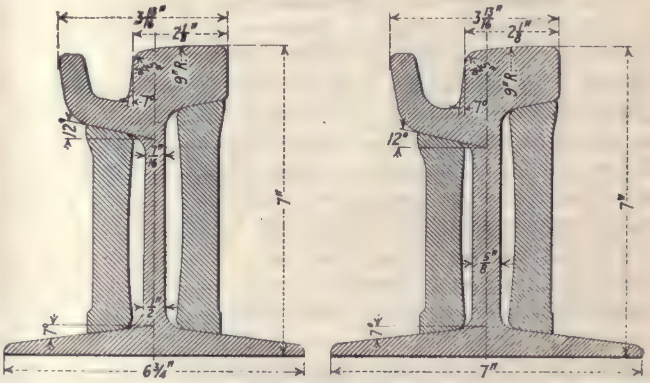
It will also be noted from the accompanying table, showing the chemical compositions specified, that the British specifications do not provide for as high carbon as do the American specifications, but for the basic open-hearth process, silicon is increased to 0.30 while American specifications call for a maximum of 0.20 and for both the bessemer and open-hearth processes. Manganese is permitted to a maximum of 1 per cent.

The British specifications provide a tensile test on a standard test piece to be cut from the rail head. The test must show a tensile breaking strength of not less than 45 tons per square inch with an elongation of not less than 10 per cent. This test is in addition to the usual falling weight (drop) test. Such a tensile test is not usually a part of any American rail specifications. There is no mention of the impression test which is being substituted for the drop test in our girder rail specifications by the A.S.T.M. and A.E.R.E.A.

The standard rail drilling adopted is shown in the accompanying illustration. It will be noted that this allows an opening of ¼ in. while it is customary in American practice to make no allowance for drilling for rails to be used in streets. The drilling indicated is 2 in., 4 in., 4 in., while American practice is generally standardized on 2½ in., 4 in., 4 in.

Rails which are intended for use with welded joints are to be undercut not more than 1/16 in.

The new British standard fishplates (splice bars) present some interesting features, which are in contrast to American practice. The fishing angles in particular are of note, the angles of the top of the plate being 12 deg. and that of the bottom being 7 deg., while the angle for American standard splice bars for girder rails is held at 9 deg. for both top and bottom.



LEFT, BRITISH STANDARD RAIL SECTION NO. 7, 103.7 LB. PER YARD.
RIGHT, B. S. SECTION NO. 8, 112.9 LB. PER YARD

Another feature is the use of 1⅛ in. square holes in the outside or wide bars in contrast to the American practice of using oval or elliptical holes in one set of bars. Both designs are, of course, for the purpose of preventing the turning of the bolt during the tightening process. There are practically no square holes used in this country in splice bars on electric railways and probably the only ones used on steam railroads are found in the standards of the New York Central Railroad and its allied lines.

Making a Sleet Cutter Out of a Worn-Out Trolley Wheel

TROLLEY WHEEL ARRANGED FOR SLEET CUTTING

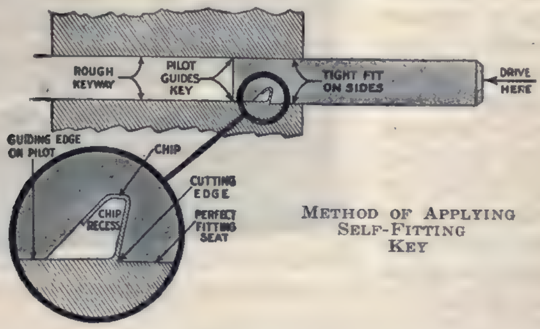
THE accompanying illustration shows a 6-in. trolley wheel which has layers of copper added to the groove so as to form a rough surface and to serve as a sleet cutter. Wheels arranged in this manner are used by the New York State Railways and have been found very satisfactory. During a sleet storm the regular type of sleet cutter used by the railway was exhausted, and these wheels were made up for emergency. They have worked so satisfactorily, however, that the railway is continuing a supply of them for future use. One advantage from the use of these wheels is that when they are placed in the cars during a sleet storm they do not need to be removed as soon as the sleet has disappeared, as they soon wear smooth and can be continued in service, while with sleet cutters it is necessary to have a gang of men remove them as soon as the sleet has been cleared.

What's New from the Manufacturers

Self-Fitting Keys

KEYS are used to make the driving connection between shafts, axles, gears, sprockets, pulleys, etc. It is usual to mill or slot the keyway in the shaft and to slot the keyway in the external member. But both of these keyway sizes will vary slightly and to obtain the desired tightness between the key and keyways it is necessary carefully to fit the parts together. This has usually been done by hand, either by filing the key to fit the keyways or by filing or scraping the keyways to fit the key.

It usually takes a good mechanic three or four hours to fit an ordinary 1½-in. x 1½-in. key. A key slightly smaller, say 1 in. x 1 in., may require only two hours and in exceptional cases may be fitted well enough in an hour. But the mechanic needs to be experienced and the key and keyways need to be almost the right size to start with in order to obtain these results. Such hand fitting generally is quite expensive work and the results are not always satisfactory.



METHOD OF APPLYING SELF-FITTING KEY

To meet this condition, Smith & Serrell, Newark, N. J., have placed a new "Keytite" self-fitting key on the market. A tough chisel stock is used and this is ground to a size very slightly larger than the nominal keyway width. A cutting edge and chip recess are provided near the front end of the key. Ahead of these is a pilot slightly smaller in dimensions than the nominal keyway width.

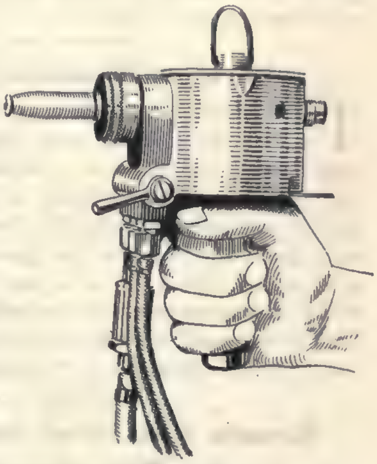
To install one of these keys the pilot is entered first with the cutting edge at the side. Then the key is driven home with an ordinary machinist's hammer or with a sledge, depending upon the size of the key. The cutting edge sizes the keyways to make a tight fit between the body of the key and the keyways.

In the larger sizes cutting edges are sometimes provided on both sides. When it is desired to fit top and bottom as well as on the sides, a cutting edge is also provided at the top. Gib keys and other modifications can be furnished as required, all with this self-fitting advantage.

Protective Coating by Metal Spraying

A Method of Applying Zinc or Lead Coating to Bridges, Railway Structures or Cars Has Been Perfected as a Means of Protecting Equipment Exposed to the Action of the Elements

A PROCESS of applying a coating to any metal parts as a protection has been perfected by the Metals Coating Company of America, Philadelphia, Pa., and is known as the Schoop metal spraying process. In this process the coating metal adheres to the object simply by mechanical union. The metal is discharged in hot impalpable particles moving with high velocity, and these when directed upon a prepared object penetrate the pores while the spray is still plastic. At present the principal use of the metal spraying process is for galvanizing. About two years ago the Swiss government adopted this method for protecting the transmission towers and girders on the electrified section of the St. Gotthard Railway. In addition to this certain railway bridges were galvanized and the underbodies of rolling stock were coated with a zinc coating.



FORM OF SPRAYING PISTOL USED

The operating principle of the process is briefly that metal wire or dust is first melted by an oxyacetylene flame and then the molten metal is blown by a compressed air jet in the form of spray against the surface to be coated. Three methods of applying the process have been perfected, each possessing particular features in its field of application. These consist of the "pistol" form which uses metal wire of standard commercial gages which is fused with gas; the powdered metal equipment, using powdered metal, as the name implies, and the electro-pistol. The wire spray process is the most extensively employed.

The principle of the spraying pistol is illustrated in an accompanying diagram. A fine wire of any metal is fed into a reducing flame zone at such a constant speed that the position of the end of the wire remains stationary, the melting rate being exactly equal to the rate of feed. As the end of the wire melts, each drop is struck a violent blow by an air blast. A fog or spray of fine metallic particles results and these pass through a diverging cone with a core of reducing gas. The spray thus forms a metal coating air brush, the diameter of which 5 in. from the pistol end is about 2 in. Objects

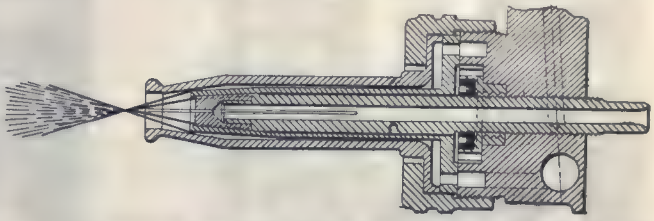


DIAGRAM SHOWING APPLICATION OF REDUCING FLAME TO METAL WIRE IN THE PISTOL to be sprayed with metal are operated upon by pointing the pistol normally at the surface to be coated at about 5 in. distance and by directing the pistol across the surface with a regular motion. A single coating is about 0.001 in. thick.

The pistol operates on an air pressure of 50 lb. and commercial oxygen and acetylene gases secured in tanks under pressure are used. A standard oxygen gage and an acetylene regulating gage are used for adjusting the proper proportions of each gas to secure the temperature required for melting the different metals. The pistol connections are attached to these gages with a set of valves.

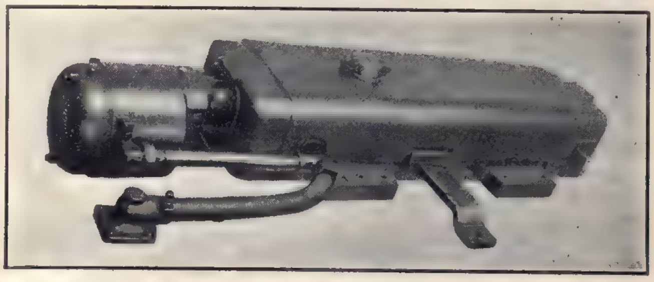
Portable Measuring Instruments

THE Westinghouse Electric & Manufacturing Company has added a new type of ammeter and voltmeter to its line of portable instruments. The instruments are designated as type PX-3. The movements of these instruments are light in weight and are mounted on a micarta sub-base which can be removed as a unit. The cases are made of molded composition which is strong and acid-resisting. A round open-faced dial gives good illumination on the scale. All instruments have external zero adjusters.

Remote Control of Outlying Switches for High-Speed Railways

TO MEET the need of electric railways for apparatus to operate remote switches, the General Railway Signal Company, Rochester, N. Y., has developed an alternating-current switch machine and means for its control. The switch machine is a compact unit, made long, narrow and low so as not to interfere with the clearances of any electric railway. It is supported on two tie timbers and is easily installed. The machine may be furnished with a motor to operate on 110 volts, 25 cycles, or 110 volts, 60 cycles, or a direct-current motor can be provided if required where alternating current is not available.

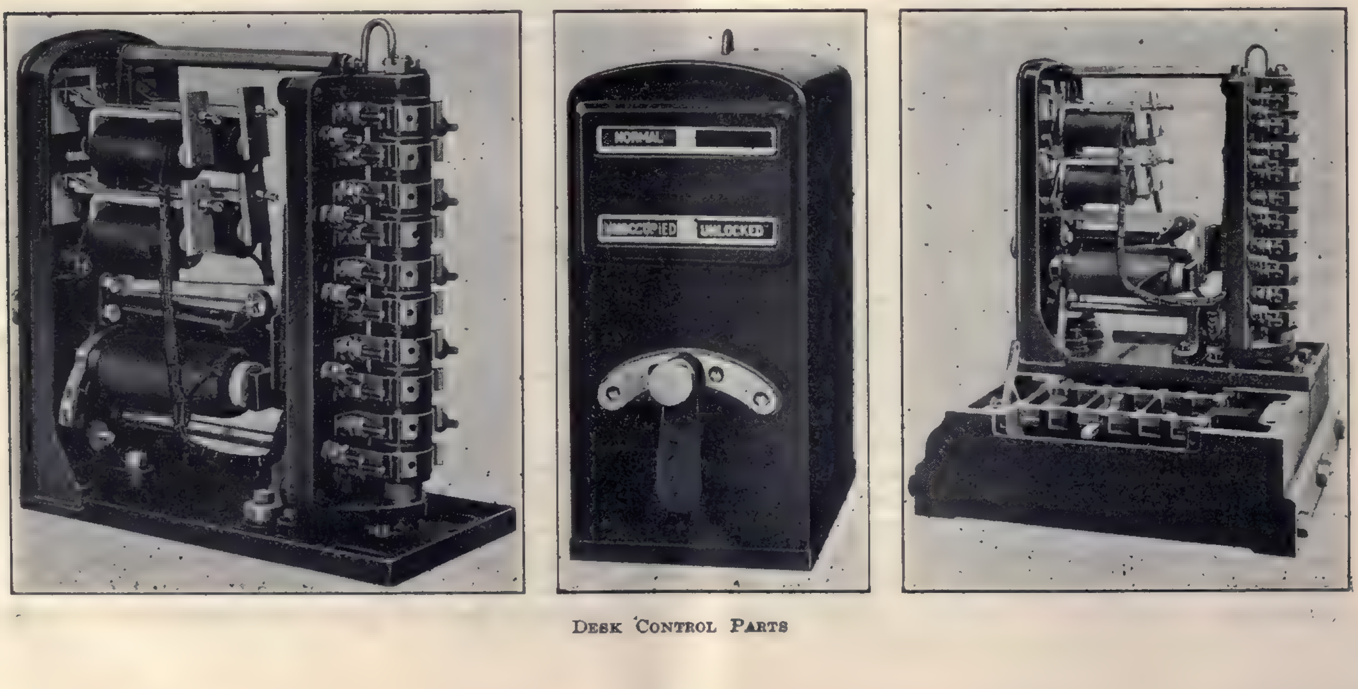
The desk-type circuit controller is a recent development which simplifies the remote control of an outlying switch layout. It is a small, complete unit measuring 12½ in. high by 6¼ in. wide by 12 in. deep and comprises a controller with ten contacts, an electric lock and four indicators. In other words, the unit contains all of the apparatus necessary in the control station to control remotely a single switch and the signals which govern over it. When it is desired to control a layout consisting of more than one switch two or more circuit controller units may be used, and if it is necessary to interlock these units a sub-base 4 in. high is furnished with each unit. The bases are bolted together and serve as a locking bed.



SWITCH MACHINE

The unit construction of the circuit controller makes it adaptable to almost any conceivable switch layout that could be remotely controlled. It may be furnished fully equipped or parts may be omitted when not required. The signals used to control train movements over a remotely operated switch layout may be of the semaphore or color light type—as desired. Practically no expense is added to the operation and maintenance of remotely controlled switch layouts if they are installed on track already equipped with automatic block signals and if they can be operated by a station attendant who has other duties.

FOUR-UNIT INTERLOCKED CIRCUIT CONTROLLER



DESK CONTROL PARTS

The Financial Side of Accident Prevention*

Expenditures on Account of Accidents and Insurance Against Accidents Are the Only Non-Productive Items of Electric Railway Operating Costs—Their Increase in per Cent of Gross Earnings Is Alarming

By GARRETT T. SEELY
Vice-President and General Manager Pennsylvania-Ohio
Electric Company, Youngstown, Ohio

FURTHERANCE of the cause of accident prevention primarily is to be considered from the humanitarian viewpoint. Efforts to reduce to a minimum accidents in industry, on the highways and in the homes are efforts directed toward the prevention of the deaths or suffering of individuals. That is the basis on which the movement for accident prevention started; that is the basis upon which we must continue to build.

The humane aspect of the work is the prime essential. Death and suffering in themselves cannot be measured in monetary units, but there is a corollary to deaths and injuries and accidents as a whole that must be measured in dollars and cents. This is the economic loss caused by the interruption to the usual occupations of those injured, the loss to industry through the deaths of workers, the utter waste of property needlessly destroyed.

This economic loss cannot be measured with exactness, but it mounts into staggering sums of hundreds of millions of dollars each year. Payments for loss and damage to property and injuries to persons by the steam railroads of the United States in the year 1920 alone amounted to $199,591,261; the total annual accident cost in all lines of industry and business has been estimated at $1,500,000,000. It is an economic loss to the entire people, and part or all of it must be paid for through the companies experiencing the accidents that cause the loss.

Cost of Accidents to Public Utilities

A somewhat detailed consideration of these dollars-and-cents losses, of this financial side of the accident-prevention work, then, is fitting. For the purpose of this discussion the cost of accidents to public utilities alone will be considered, adequate figures to include the whole field of industry not being available.

Every cent spent by public utilities for operating expenses, taxes and interest is devoted to something productive, with the exception only of those sums expended for accidents and insurance. The money spent for maintenance restores the physical property to normal condition, providing new tracks, equipment, poles, ties, wires, insulators and the like; the money expended to produce gas or power yields something that is salable; the sums disbursed in wages produce that which is salable, or do some constructive work; the taxes paid, inequitable and burdensome though the portion placed upon utilities may be, secure fire, police and governmental protection. Interest and dividends paid make it possible to obtain new capital for improvements and extensions; but the money expended because of accidents cannot in any way be considered as productive. It is a severe drain on the earnings of the industry—it is irretrievable waste.

Little published information is available as to the actual cost of accidents of all classes, including legal and claim department expense chargeable thereto. The United States Census Bureau's report on electric railways gives the cost of accidents for 1917, but no figures for earlier or later years were obtainable. An excellent and complete report on the cost of accidents on the steam railroads from 1897 to 1920, inclusive, is contained in a publication entitled "Railway Statistics of the United States of America for the Year Ended 1920," prepared by Slason Thompson, Bureau of Railway News and Statistics, Chicago. The information bearing on our subject which has been obtained from these two sources will be given in detail later.

Government Reports Not Complete

There are no government reports or compilations prepared by national associations available to show the accident costs of water companies, telephone and telegraph companies, gas companies, electric light and power companies, interurban railway companies or city street railway companies.

Therefore, to secure sufficiently comprehensive data on the accident costs of the various utilities, several hundred letters were sent to representative companies in all parts of the United States. These letters asked for the total cost of accidents and damages, including expenses of claim and legal departments, and the gross earnings of each of the companies for the last five years. The generous response to these hundreds of questionnaires made possible a study of the subject that may be accepted as truly representative of the utilities of the country as a whole.

In the study made of the statistics obtained, the averages for the last five years were taken rather than the figures for one year, as it was felt that such averages would reflect more accurately the conditions that actually obtain. A careful effort also was made to segregate the earnings and accident costs of companies operating more than one class of utility, so that the grouped figures for each classification would be representative.

The gross earnings of all utility companies increased at an abnormal rate during this five-year period, due largely to rate increases. The cost of settling accident claims also increased greatly, because of the lessened value of the dollar.

The amount of money and the percentage of gross earnings expended because of accidents vary widely with the different classes of utilities. They vary almost in direct proportion with the degree of contact on the part of the public with the commodity sold or the equipment used in rendering service while such commodity or equipment is under direct control of the utility. They also vary in proportion to the extent that the business of the utility is conducted on or across public streets or highways.

As is to be expected, the water companies and the telephone and telegraph companies have the smallest number of accidents, both to the public and their employees, and the lowest costs in proportion to earnings of all utilities. There is nothing hazardous in itself about the commodity they have for sale or the means of rendering service. Their mains and pipes and wires and equipment in general are well removed from normal contact with the public.

To a somewhat lesser degree this also is true of the gas companies. Their commodity does present some hazards of fire, explosion and asphyxiation, but their pipes or conductors, or the vehicles transporting the commodity, are entirely underground or built in walls and floors of buildings or firmly attached to permanent structures.

The point of delivery of their commodity usually is at the entrance of a building, where practically all responsibility of the utility ends. The utilization of the commodity is in the hands of the consumer, and service is affected only to a minor degree by weather conditions and not at all by traffic on the streets or by any such public interference.

Electric light and power companies are next in low costs of accidents. They render no service openly on the public streets and the commodity furnished is carried either in underground conduits or in insulated wires high enough above the streets to be away from the public. Poles, wires and insulators may fall and storms may create undue stresses, but the public, under normal conditions, does not come into direct contact with the vehicle carrying the commodity.

Measure of Responsibility Important Factor

Transportation companies are engaged in a business that is most hazardous to the public and to employees. Generally speaking, the business is the carriage of human beings or material articles and the company is responsible for their security from the time the persons present themselves or the articles are turned over to it until delivery at their destinations.

Steam raiload are almost entirely on private right-of-way and grade crossings in congested city and rural districts are rapidly being eliminated. Collisions and derailments are the most general sources of accidents. Elevated or subway electric lines carry passengers only, but operate their cars either above the street level on isolated structures or below the street level and their type of construction is such as are likely to reduce accidents to the minimum.

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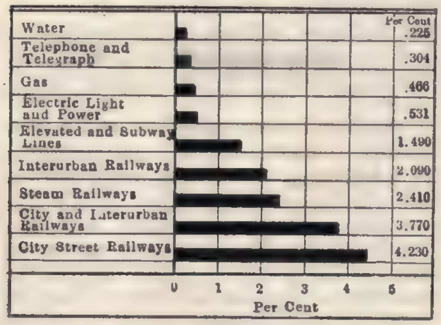
*Abstract of paper presented at eleventh annual convention of National Safety Council, Detroit, Aug. 28-Sept. 1, 1922.

Surface electric lines have the most intimate contact with the general public and, accordingly, they have the greatest accident cost. Their business is chiefly the carriage of human beings and these are carried in light cars in the midst of dense traffic, the cars threading their way among pedestrians and rapidly propelled vehicles, which are under the control, many times, of irresponsible individuals.

With these varying conditions in mind, let us turn to the consideration of some of the actual costs that the various utilities have had to meet and see in dollars and cents how important is the "Financial Side of Accident Prevention."

STEADILY RISING PERCENTAGE OF GROSS RECEIPTS

As has been stated, a complete compilation of the cost of accidents on steam railroads was obtained from the 1920 issue of "Railway Statistics of the United States of America." Table I shows payments on account of loss and damage and injuries to persons, the gross earnings and the proportion of each of the above items to gross earnings for each fifth year from 1900 to 1915 and for each year from 1916 to 1920, inclusive. The loss and damage items include payments on account of loss and damage to freight, baggage, property and livestock. The injuries to persons include costs of accidents to employees, passengers and the general public.



ACCIDENT COSTS OF PUBLIC UTILITIES EXPRESSED IN PERCENTAGE OF GROSS EARNINGS

It will be noted that in 1900 the cost of loss and damage to property was less than the cost of injuries and damages to persons.

TABLE I—STEAM RAILROADS OF UNITED STATES—PAYMENTS ON ACCOUNT "LOSS AND DAMAGE" AND "INJURIES TO PERSONS" AND PROPORTION TO GROSS EARNINGS

		Loss and Damage		Injuries to Persons		Total Cost of Accidents	
Year	Gross Earnings	Amount	Per Cent of Gross	Amount	Per Cent of Gross	Amount	Per Cent of Gross
1900	$1,487,044,000	$7,055,622	0.474	$8,405,980	0.565	$15,461,602	1.04
1905	2,082,482,000	19,782,692	0.950	16,034,727	0.770	35,817,419	1.72
1910	2,750,667,000	30,984,854	1.127	23,665,488	0.860	54,650,342	1.98
1915	2,956,103,000	37,947,468	1.284	27,090,222	0.916	65,037,690	2.20
1916	3,679,989,000	31,274,827	0.850	30,156,759	0.819	61,431,586	1.66
1917	4,074,672,000	94,079,992	1.082	34,109,331	0.837	78,189,323	1.91
1918	4,969,910,000	66,300,736	1.334	34,229,536	0.689	100,530,267	2.02
1919	5,231,750,000	117,671,790	2.250	38,238,803	0.731	155,910,593	2.98
1920	6,300,160,000	142,227,070	2.260	57,364,191	0.910	199,591,261	3.17

In 1915, the gross earnings had increased practically 100 per cent, while the loss and damage had increased more than 400 per cent, and injuries to persons had increased more than 200 per cent. The combined cost increased $65,037,690, or more than 300 per cent, while the percentage of gross earnings thus paid out increased from 1.04 per cent in 1900 to 2.20 per cent in 1915.

In 1916, 1917 and 1918 there was very little change in the percentage of gross earnings required to meet these costs, despite the fact that the gross earnings increased greatly.

In 1920, while the gross earnings increased to more than $6,300,000,000, the loss and damage costs had risen to 2.26 per cent of the gross earnings, and the cost of injuries to persons had increased to 0.91 per cent, making the combined cost $199,591,261, or 3.17 per cent of the gross earnings. Thus, while in twenty years the earnings had increased from $1,487,000,000 to $6,300,000,000, or 324 per cent, the cost of loss, damage and injuries had increased from a total of $15,461,502 to $199,591,261, or an increase of 1,191 per cent.

PAYMENTS MADE BY ELECTRIC RAILWAYS

While confined to one year and therefore not nearly so satisfactory as the complete data concerning the steam railroads, Table II, from the United States Census Report for 1917, is illuminating.

TABLE II—ELECTRIC RAILWAYS OF UNITED STATES—ACCIDENT COST, 1917

District	Gross Earnings	Accident Cost	Per Cent
New England	$68,399,091	$2,883,646	4.2
Middle Atlantic	230,354,775	8,529,035	3.7
East North Central	162,091,962	5,465,417	3.3
West North Central	52,455,024	2,140,595	4.1
South Atlantic	42,426,736	1,455,076	3.4
East South Central	15,882,474	955,783	6.0
West South Central	20,166,036	887,217	4.4
Mountain	10,294,660	233,285	2.3
Pacific	48,079,048	1,193,377	2.5
Total	$650,149,806	$23,743,431	3.65

A considerable difference in percentage is shown for the various geographical groups, but the two groups showing the highest and the lowest cost contain comparatively few companies and the variations shown are no greater than between individual companies in approximately the same geographic locations.

INFORMATION GLEANED FROM QUESTIONNAIRES

From the questionnaires sent out additional data were obtained, which, with the complete statistics of the steam railroads, permit us to group the various classes of utilities in regard to the relative cost of accidents. The large number of responses to the request for the gross earnings and accident costs was most gratifying. It is believed that a sufficient number of companies in each group replied to make the results shown in Table III fairly representative.

The earnings and accident costs were separated strictly in accordance with the character of the service, with the single exception of the item "City and Interurban Railways." Here the earnings and accident costs are shown for one group of companies operating both classes of service in such manner that it was impossible to make a separation between city service and interurban service.

TABLE III—ACCIDENT COST OF PUBLIC UTILITIES EXPRESSED IN PERCENTAGE OF GROSS EARNINGS

	Average of Last Five Years		
	Gross Earnings	Accident Cost	Per Cent of Gross
Water companies	$6,961,896	$15,713	0.225
Telephone and telegraph companies	387,800,942	1,179,312	0.304
Gas companies	94,616,598	441,365	0.466
Electric light and power companies	159,672,546	847,977	0.531
Elevated and subway lines	89,553,846	1,337,164	1.49
Interurban railways	20,329,306	425,773	2.09
Steam railways	4,940,000,000	119,120,000	2.41
City and interurban railways	41,122,343	1,551,424	3.77
City street railways	337,272,147	14,274,290	4.23

NOTE: Amounts shown above for gross earnings and accident costs are only for companies replying to questionnaires, and do not represent total figures for the United States except in the case of steam railways. The information shown in this tabulation is expressed graphically in the accompanying chart.

VARIATION SHOWN BETWEEN INDIVIDUAL COMPANIES

It will be noted that the percentage of gross earnings required to meet accident costs for water, telephone and telegraph, gas, and electric light and power companies is relatively small, while among transportation companies, that group whose business is the carriage of human beings in vehicles that are operated in public streets (that is, the city surface railways) has the highest percentage of accident cost.

In each group of utilities, individual companies showed a great variation in percentage of accident costs, but a company having a high percentage is not necessarily operating in a careless or negligent manner. Local conditions with regard to the activity of personal-injury lawyers, the laws of the state, and local precedents have a most important bearing on the costs of accidents but no relation to this number or seriousness.

As an illustration: In two large cities, not widely separated, both companies efficiently managed, the cost of accidents in one is 2 per cent of the gross earnings and in the other 8 per cent of the gross earnings. For a typical large company with gross earnings of $5,000,000 a year, the difference between 2 per cent and 8 per cent in the cost of accidents is $300,000 a year, which is equivalent to carrying charges at 8 per cent on $3,750,000.

While it is natural, perhaps, to view the importance of the financial side of accident prevention from the percentage of gross earnings required to meet the cost of accidents, no company having a ratio less than the average should feel that it is doing the best it can, or that it is impossible for it to make further reductions in the number and cost of accidents.

It is found that the relative importance of various classes of accidents changes from year to year. For instance, a number of years ago boarding and alighting from cars was the most serious cause of accidents on street railways, while accidents due to collisions with vehicles were not a severe drain. The use of inclosed platforms and doors has done much toward the elimination of step accidents, while the increasing number of automobiles used and the greater congestion in city streets therefrom have made automobile accidents the most expensive class for street railways. An analysis of the amount of money expended during a year or two years, classified as to the causes of the accidents, will be a better criterion by which to select the field for intensive work in reducing accident expense than the number of accidents occurring in any particular classification. In view of the difficulty experienced by utility companies in assembling comprehensive accident data, it might be to the interest of all concerned if the various national associations or governmental agencies would assume the task of compiling this information and analyzing it so as to point the way for a reduction of this tremendous tax on industry and business.

HUMANITARIAN SIDE OF WORK COMES FIRST

In view of the experience of every class of utility and industry, might it not be well to work for greater co-operation in combating that insidious and extremely costly evil, the activities of the "ambulance-chasing" personal-injury lawyer?

Always keeping in mind that the humanitarian side of accident-prevention work comes first, nevertheless let us not forget that the financial side is where we find the measure of economic loss, that whatever we may be able to do to reduce the number of accidents is so much accomplished toward eliminating irretrievable waste, is so much won for the economic improvement of the entire nation.

The Human Side of Our Business*

Decent Treatment of Workmen by Those in a Supervisory Capacity as Much a Factor in Accident Prevention as Safety Devices on Dangerous Machines

BY BRITTON I. BUDD
President Chicago Elevated Railroads and Chicago, North Shore & Milwaukee Railroad

THERE is a trite saying that "there is no sentiment in business." Equally shopworn is the phrase that "corporations are soulless." The fact that so many representatives of large corporations and of big business enterprises are here today to discuss methods of conserving human life and limb is as complete a refutation as could be found of the challenge that corporations are soulless and that there is no sentiment in business.

I shall approach my subject from a different angle than that usually taken at safety gatherings of this kind. By that I mean that I shall not dwell on the human misery caused by accidents, the number of which, happily, is being gradually and surely reduced year by year by the excellent educational work carried on by the National Safety Council. That particular phase of the "human side of our business" is well understood by all who are engaged in this great work of accident prevention. It makes an appeal which no one can resist.

But there is another angle to the human side of our business which is closely related to accident prevention and which I think sometimes is not as much emphasized as it ought to be.

Decent treatment by men in a supervisory capacity of those working under them is, in my judgment, as much of a factor in accident prevention as are the safety devices which we place on dangerous machines and on which we lay so much stress. I will go further and say it is a more important factor, because if workmen are not treated as thinking human beings by those having authority over them, they are constantly in such a frame of mind that they will cause accidents in spite of all the safety devices and precautionary methods that can be adopted.

It is a common saying that the best safety device is a careful man. I fully agree with that saying, but would add that to make a man careful you must treat him in a way that makes him contented in his work, in a way that will make him glad to meet his foreman or superintendent rather than afraid to meet him. That is the human side of our business which I wish to emphasize.

Fear is one of the causes of accidents. Frequently we call it "carelessness," but if we look more carefully into the subject, we may discover that the seeming carelessness was due to a nervous condition. Those who have made close study of accidents in a shop or factory have found that a frequent cause of accident is some trouble over which the workman was brooding at the time the accident occurred. The cause of the brooding may have been some family trouble, or some difficulty with a foreman or a superintendent, but it was sufficient to bring on a nervous strain that took the workman's mind off his work.

How many times have you observed a workman under the critical eye of a foreman become so nervous and excitable that he scarcely was conscious of what he was doing? Some workmen are of an excitable temperament, and it requires only some tactless act on the part of a foreman to put them in a frame of mind in which they are largely irresponsible.

Men in positions of authority have a great deal of responsibility in the matter of safeguarding the lives and limbs of workmen under them. In some respects they bear the same relation to the men under them that the father does to his child. A wise father does not exact obedience from his child through fear of punishment, but through respect. He must set a good example and win the child's confidence by kindliness. A child in constant dread of his father may, for a time, have respect for authority, but soon he will have little respect for the father.

It is the same with the foreman or superintendent who seeks to enforce discipline by harsh treatment of the workmen under him. He loses their confidence, with the result that the character of the work itself usually is inferior and the danger of accidents is greatly increased. What is needed is a little more human understanding, or, in other words, a closer study of the human side of our business. Every one who has had experience in dealing with men knows the effect of an accident on the morale of the working force. For a time after the accident takes place the shop or railroad is demoralized. Fear has crept in and weakened the morale.

So it is if men are in constant fear of their foreman or superintendent. The morale of the force is weakened and to that extent the danger of accidents increased. I do not wish to convey the impression that I think men always should be patted on the back, or that strict discipline should not be maintained. Although I believe there is, and should be, some sentiment in business, I do not believe in sentimentality.

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*Abstract of address presented at the annual convention of the National Safety Council, Detroit, Aug. 28-Sept. 1, 1922.

My contention simply is that the cheerful manner, the sympathetic word, the kindly act will bring much better results than the gruff and domineering manner or harsh treatment.

ESPECIALLY IMPORTANT ON ELECTRIC RAILWAYS

In the electric railway industry, with which I am connected, the human side is of the greatest importance. Success in our industry is dependent on the good will of the public, and the public forms its opinion of a company largely by the conduct of the employees with whom it comes in direct contact.

It is of the greatest importance, therefore, that the employees of a company engaged in the service of the public be cheerful and contented in their employment, that they be courteous and polite to the customers of the company; that they, in fact, consider themselves a part of the company.

To produce such a spirit among employees it is essential that they be treated as human beings. If those in authority do not treat the men under them with proper respect, how can they expect the men to treat the public courteously and respectfully? When the employees serving the public are in a happy and contented frame of mind their good humor extends to their passengers. On the other hand, if the employees are grouchy and irritable, their manner irritates their passengers. Keep employees in a contented and happy frame of mind and many of our troubles will disappear.

Human nature is much the same the world over. Seldom do we find a man so callous that he will not respond to a touch of real human sympathy. Seldom do we find a man who will not inwardly, if not outwardly, resent unjust or harsh treatment.

The brief message which I wish to bring to you men, most of you occupying positions of authority, is that the human side of our business is more important even than the financial side, because it is necessary to the financial success of our business that we establish and maintain good human relations. The more attention we pay to the human side of our business, the more successful will we be on the financial side. The better that our human relations are with the men who work for us, the safer will our operations be, whether on the railroad or in the shop or factory.

The Proposed Public Utilities Advertising Association*

By W. P. STRANDBORG

Chairman Organization Committee, and Publicity Agent Portland Railway, Light & Power Company, Portland, Ore.

IT SEEMS strange that the public utility industries, such as electric railways, light and power, gas, telephone and others, have never been able to put their publicity and advertising work on the same basis as other large organizations of less vital importance to the American people. We have in the four major utilities enumerated, a total capital investment of over sixteen billion dollars, and protection of that investment is largely in the hands of the public who legislate and regulate concerning utilities with and without our own leave.

Now we all know that a very large and important element in the creating and maintaining of good will on the part of our customer public must be looked after by the men who are identified with that important section of our industry—the public relations men, and under this classification of course come our active advertising and publicity managers. So that in proposing the organization of a Public Utilities Advertising Association, the foregoing is a birdseye view of the field within which we may properly and profitably function. It is proper to include both publicity and advertising men in the new association, because in a very large number of cases, both the publicity and advertising activities of the individual companies, as well as of the national associations, are directed by the same leader or at least by the same staff of workers.

One of the important thoughts in mind in connection with the proposed plan is to get away, so far as possible in our public utility life, from the so-called "press agent" who in many of our utilities and other industries for years past has had for his chief duty the questionable assignment of trying to put things over on the newspapers and other publications. We hope to develop within our new organization a firm, fixed policy, subscribed to by every concern that joins our ranks, to the effect that we pledge ourselves to go out after advertising and publicity work on a strict business basis and pay for what we get. In other words, the men who are behind the new movement are firmly convinced that there is no place in our industry any longer for the man who tries to beg, borrow or steal space in the newspaper, but there is a growing demand for the presentation of our public utilities story in a frank, honest and fearless manner.

Millions of dollars are spent for advertising each year by our public utilities, and with very few exceptions, each advertising manager spends his money in his own way and works out his own campaigns without relation to or consideration of the great and universal problems that affect both the personal and physical service of all companies. It is not hard to understand why the situation is so, for the reason that until very recently the individual public utility advertising manager has had no clearing house through which valuable ideas and suggestions that would be of benefit to him in his local activities could be presented and worked out through the associated effort of the most skillful advertising and publicity men in the industry.

We find occasionally that a national convention will give a publicity or advertising man place on the general program for reading a paper. Sometimes a round table conference, or an informal meeting of publicity and advertising men is included in the activities of the national convention, but beyond that we have practically been orphans.

It is not the purpose of the new Public Utilities Advertising Association to supersede or duplicate any of the constructive work now being done by national associations within our major public utilities. It is rather to work with them, and perhaps to co-ordinate their efforts with ours in such a way so that we will all be mutually benefited. The fact that the men directing the advertising and publicity work in the A.E.R.A., A.G.A. and N.E.L.A. are all represented on our organization committee is evidence enough that there is a valuable work for us to do, and that these national leaders are willing to co-operate with us in bringing all the utilities together into one efficient operating body. We hope likewise to secure the fullest co-operation from the great manufacturing industries which are identified in a business way with one or more public utility organizations.

The new Public Utilities Advertising Association has the backing of the major utilities themselves, also of approximately fifteen of the directors of state committees on public utility information, and scores of individual companies whose favorable attitude has been reflected in the large volume of inquiries which has come to the organization committee during the past sixty days. In addition to this, it is very gratifying to know that many trade publications dealing with public utilities have requested further information about our movement, and the editors of these publications have expressed their emphatic indorsement of the plan and tendered the fullest use of their columns.

Technical details of the plans for organization need not be discussed at this time, for they will properly come through the selection of sub-committees when our general organization conference is held in Chicago during the coming American Electric Railway Association convention, to be held on the Municipal Pier during the week of Oct. 2-6, inclusive.

Another point. We hope to have our association admitted as a department of the national advertising commission, and to conduct our own convention each year as part of the great world advertising convention, and it is through contact and association with these thousands of advertising experts that we shall derive the greatest benefit from our proposed Public Utilities Advertising Association.

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*Abstract of paper presented at the convention of the Associated Advertising Clubs of Iowa, Mason City, Ia., Sept. 12-13, 1922.

French Tramway Track Construction

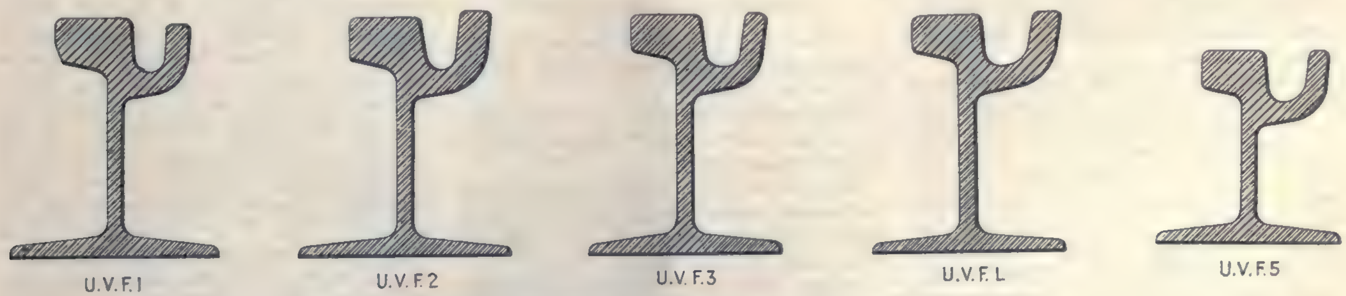
Engineer of Paris Unified Transportation System Points Out Some Special Features of Track Problems in that City—Several Rail Sections Evolved from Experience Are Given

THE coming discussion on the 1922 report of the committee on way matters of the American Electric Railway Engineering Association renders timely a brief review of the report presented at the last (1921) meeting of L'Union des Voies ferrées d'intérêt local et des Transports publics automobiles, by M. Gagné, chief engineer of electric services, track and buildings of the Société des Transports en commun de le Region parisienne (the unified system in Paris). This report covered the subject of tramway track construction and traced the history of tramway track construction back to its beginning in France.

The author said that at the close of the war, when the question of standardization came up, the union had been able to utilize, without undertaking new investigations, the work which it had done before 1914, notably on grooved rails. Only the five types shown in section below had been conserved. These rails are known respectively as U.V.F.1, U.V.F. 2, U.V.F. 3, U.V.F.L. and U.V.F. 5.

Rail U.V.F. 1 is the section employed for tangent track in the important centers where traffic is intense. Rail U.V.F. 2 is an adaptation of the preceding for curved tracks. Rails U.V.F. 3 and U.V.F. 5 are lighter sections intended for systems in smaller cities. The section U.V.F.L., with a large groove, is for use in track where both tramways and steam railroads must be accommodated on the same stretch of track.

In the U.V.F. rails the form of cross-section is based on the following principles: The base of the rail is made as wide as possible, compatible with the possibilities of rolling; while the web has the minimum permissible thickness, to keep down the weight and at the same time not permit bending, in order to reserve for the parts subjected to wear the greatest amount of metal possible. The position and height of the head with respect to the groove were determined in such a way that when the flange of the wheel bears on the bottom of the groove the head will yield the maximum of wear. The author points out that as researches have shown that the best form for the wheel tread is a cylindrical surface, the surface of the rail on which the wheel rolls should be a plane.



FIVE STANDARD FRENCH GIRDER GROOVED RAIL SECTIONS

U.V.F.1, for heavy traffic, tangent track; U.V.F.2, same, but for curves; U.V.F.3 and 5, for lighter traffic; U.V.F.L., for use where steam railroad cars must be accommodated.

DIMENSIONS OF FRENCH TRAMWAY RAILS—ALL DIMENSIONS IN INCHES

	U.V.F.1	U.V.F.2	U.V.F.3	U.V.F.L.	U.V.F.-5
Height over tread	7.1	7.1	6.9	6.9	5.7
Width of base	6.3	6.3	5.7	5.7	5.5
Thickness of web	0.43	0.43	0.41	0.41	0.40
Width of head over all	4.0	4.25	4.0	4.45	3.75
Depth of groove	1.57	1.57	1.57	1.57	1.5

SPECIAL RAIL SECTIONS FOR USE ON CURVES

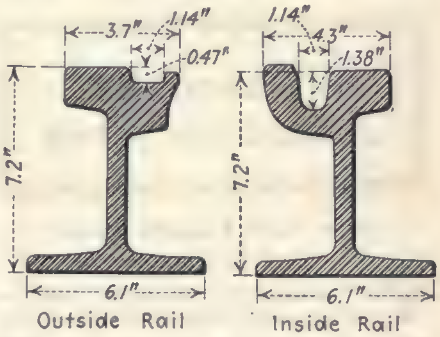
The quality of the steel of the rail was made the subject of careful study by the tramways companies, particular attention having been directed to this matter after American rails had been purchased in 1915. These gave better results than the pre-war French rails. As a result modifications in the specifications for rail steel have been made.

Tests have also been undertaken with alloy steels, such as titanium-steel, silicon-steel, etc. The tests include rails treated by the Sandberg sorbitic process. No conclusions have been reached as to these special rails.

Manganese steel has been used for a long time on curves. It is well known that on curves it is the guard section of the inside rail which wears most rapidly, so that the first inclination would be to make only this guard section of manganese steel. Further, it is known that to diminish the wear on the guard of the inside rail and of the rolling surface of the outside rail, it is desirable on curves to raise the bottom of the groove in the outside rail so that the flange of the wheel will roll on the bottom of the raised groove and not the wheel tread on the rail surface.

The use of a separate manganese guard rail was considered to involve troublesome maintenance so that there were made in 1913 some special manganese rails which gave excellent results. The inside rail was made with a heavy guard section and a deep grove, while the outside rail had a light guard section and a shallow groove. The use of these special section rails of manganese on all curves of less than about 100 ft. radius has been decided upon in Paris, but the rails will have the modified sections shown in section below. These were designed to utilize most effectively the expensive manganese steel.

The Paris company has adopted three types of tongue switch corresponding to three radii of the branch-off curves approximately 65 ft., 100 ft. and 165 ft. The author notes that some systems have successfully employed tongue switches with a mate opposite. It does not appear that this can be done in all cases, but its advantages recommend it in many.



SPECIAL MANGANESE RAILS FOR USE ON CURVES WHERE SERVICE IS SEVERE

The engineers of the company have therefore been studying, but only for the 65-ft. radius switch, the use of a mate, or, as the author terms it, "a fixed-point switch."

As to the system of switch control the T.C.R.P. (Paris unified system) has employed a plan in which several switches are controlled from a control station. Satisfactory results have been obtained from this and the author anticipates the perfection of automatic electric control based on the same principle. He says that France seems to be slow in the solution of this problem which has been solved in other countries.

Much of the lack of success in previous electric control experiments has lain in the imperfect functioning of the electro-magnet. The T.C.R.P. has preferred to change the control system, and in place of the magnet uses a motor as in steam railroad practice to operate the switch.

In connection with this apparatus the following points have been considered: The condition of security must come before all others, and all chances of collision must be eliminated. The apparatus must be arranged in such a way that the switch tongue in repose remains open for the right track. A motorman going to the right will have no operation to perform, while one passing to the left will throw the switch while passing without current under a contact some distance ahead of it and will restore the switch to the normal position in passing under a contact outside the danger zone beyond this.

American Association News

New York Central Train Leaves Sunday

THE schedule of the special train to the American Electric Railway Association convention over the New York Central lines has now definitely been set. A special train for the convention over the New York Central lines will leave the Grand Central Terminal, New York, at 1 p.m. Sunday, Oct. 1, connecting at Albany with a special car or cars leaving Boston at 10 a.m. on the same day. Stops will be made at Poughkeepsie, Schenectady, Utica, Syracuse, Rochester, Buffalo, Cleveland and Toledo, as well as at Worcester, Springfield, Pittsfield, and Chatham on the Boston & Albany. The train is scheduled to reach Chicago at 1 p.m. on Monday, Oct. 2. The one-way fare from New York, exclusive of Pullman, is $32.70, and the round trip $49.05. Entertainment and special features are being arranged.

Reservations of those from New York State should be sent with remittance to C. B. Keyes, General Electric Company, 120 Broadway, New York, who will supply other information. Those who wish reservations on the special car from Boston should make reservations with and send remittance to F. F. Stockwell, general manager Barbour-Stockwell Company, 205 Broadway, Cambridgeport, Mass. Accommodations will be allocated in the order in which they are received. The return tickets have a final return date of Oct. 12 and will be good on any New York Central train except the Twentieth Century Limited.

Program of the Claims Association

AN EIGHT-PAGE pamphlet, entitled "The President Has the Honor to Report to You," has been issued by the Claims Association, giving an account of the topics to be taken up at the Chicago convention, the objects sought by the association, subjects at previous meetings and other information of value to all interested in safety and claims.

Sessions of the Claims Association will be held on the afternoons of Oct. 2, 3, 4 and 5, and the program will be built around the four following basic subjects: Prevention of accidents, discouraging unreasonable claims, minimizing inequitable expenditures and defending litigation.

Program of the Accountants' Association

THE final program of the American Electric Railway Accountants' Association for the 1922 convention is now available and is presented below:

MONDAY MORNING, OCT. 2

9.30 A.M. to 12.30 P.M.

Registration and distribution of badges at booth at Municipal Pier.

MONDAY AFTERNOON

2.00 p.m. to 4.30 p.m. Meeting held in Accountants' Hall.

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees on resolutions and nominations.

Four-minute address on safety by a representative of the Transportation & Traffic Association.

Report of Committee on Standard Classification of Accounts, H. L. Wilson, treasurer Boston Elevated Railway, chairman.

Address on "Present-Day Responsibilities of Public Utility Accountants." by Walter H. Timm, clerk New Hampshire Public Service Commission.

TUESDAY AFTERNOON, OCT. 3

2 p.m. to 3 p.m. Joint meeting with Engineering Association, to be held in Engineers' Hall.

Four-minute address on safety by a representative of the Transportation & Traffic Association.

Report of joint engineering-accounting committee—Charles R. Harte, chairman (Engineering); H. C. Kimball, chairman (Accountants).

Paper—"Related Function of Engineer and Accountant in Public Utility Development," Edwin D. Dreyfus, engineer West Penn Railways, Pittsburgh, Pa.

At the conclusion of the discussion of Mr. Dreyfus' paper the Accountants will adjourn to Accountants' Hall and the accounting session will be continued as follows:

3:00 p.m. to 4:30 p.m. Report of committee on stores accounting—R. A. Weston, special accountant the Connecticut Company, New Haven, Conn., chairman.

General Forum—A "round table" talk, which was a feature of the 1921 convention, will follow the report of the committee on stores accounting.

WEDNESDAY AFTERNOON, OCT. 4

2:00 p.m. to 4:30 p.m. Meeting held in Accountants' Hall.

Four-minute address on safety by a representative of the Transportation & Traffic Association.

Report of committee on relations with other associations, M. W. Glover, general auditor West Penn Railways, chairman.

Address on "The Budget—Its Preparation and Administration," by Harry A. Snow, assistant controller the Detroit Edison Company.

THURSDAY AFTERNOON, OCT. 5

2.00 p.m. to 4.30 p.m. Meeting held in Accountants' Hall.

Four-minute address on safety by a representative of the Transportation & Traffic Association.

Report of committee to represent Accountants' Association at the annual convention of the National Association of Railway & Utilities Commissions, by W. L. Davis, auditor Lehigh Valley Transit Company, chairman.

Informal talks by past-presidents and presentation of badges. "Master of Ceremonies," William F. Ham, president Washington Railway & Electric Company.

Report of convention committees on resolutions and nominations.

Election and installation of officers.

Adjournment.

Red Special Reservations

THE schedule of the "Red Special" is out. The train runs as a second section of the Pennsylvania Liberty train No. 5, leaving New York at 11:05 a.m. (standard time) on Saturday, Sept. 30, reaching Chicago about 9 a.m. Sunday morning. Reservations may be made with the following: New York, C. H. Beck, Room 2101, 165 Broadway; Philadelphia, Thomas H. Cooper, Westinghouse Electric & Manufacturing Company, Widener Building; Baltimore and Washington, L. H. Palmer, United Railways & Electric Company, Continental Building; Pittsburgh, F. G. Hickling, Westinghouse Electric & Manufacturing Company, Union Bank Building. Accommodations on the return trip can be arranged in Chicago with the Pennsylvania representative, F. E. Scott, who will accompany the "Red Special" to Chicago, and will have headquarters on the pier during the convention. Baggage will be handled as usual.

Meeting of Publicity Agents

FOLLOWING the plan adopted at the Atlantic City convention in 1921, the publicity agents of railway companies in attendance at the convention will hold a round table discussion on Wednesday afternoon. The time of meeting has been set at 2:30 and the place is the Better Health Exhibit room on the pier. Labert St. Clair says that no set program has been arranged for the meeting, but a profitable time may be expected by all in attendance.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Strike Fund Financed

Philadelphia Men Back Mr. Mitten with $1,000,000 to Carry On Campaign Against Jitney at Buffalo

Trustees of the co-operative wage dividend fund of the employees of the Philadelphia Rapid Transit Company have arranged for the purchase from the trustees for the stockholders of the International Railway, Buffalo, and the future resale to them, of $2,000,000, par value, of International Railway 5 per cent bonds for $1,000,000, the proceeds to be used by the International to continue the fight against union domination of the local and interurban lines of the company in western New York.

This announcement on the part of Thomas E. Mitten, chairman of the board of directors of the International, came as a severe blow to the motormen and conductors at Buffalo who have been on strike since July 1. Within the last week there have been many desertions from the ranks of the strikers and a large number of former strikers are now operating local and interurban cars on the International lines.

MAYOR'S PROPOSAL FLATLY REJECTED

Walter P. Cooke, one of the three voting trustees of the International and chairman of the board of the Marine Trust Company, Buffalo, to whom Mayor Frank X. Schwab appealed to help end the strike by appointing two members of a board of arbitration to settle the problem, flatly rejected the Mayor's proposal. He said:

> In the recent strike in which Mr. Tulley (president of the International) and his associates had to contend with a campaign of intimidation and lawlessness, they conducted a dignified, manly and straightforward fight which I believe must have commanded the respect of all thinking people.
>
> I have talked with Mr. Tulley in reference to your desire that the company should enter into your proposed arbitration and beg to advise you that the company feels for the reasons already repeatedly stated that it is unable to comply with your request.

Added impetus has been given the campaign of the International to rid the streets of jitneys which are operating in defiance of the Supreme Court and the Appellate Division by the decision of Justice Harley N. Crosby of the Appellate Court, who has denied the motion to vacate his anti-jitney injunction requiring Mayor Schwab to remove the jitneys from the streets of Buffalo. The motion to vacate the injunction was made by counsel for the jitney drivers.

The opinion of Justice Crosby points out that the operation of jitneys is not only "positively forbidden by law but that it is indeed actually criminal." The opinion, in part, says:

> Such of the defendants, if any such there be, as entered upon their illegal business in the belief that they were acting legally, may well be entitled to sympathy, but the imposition practiced upon them was not practiced by the plaintiff (the International Railway) nor by the courts. The law must be respected. Our courts have never gone the length of giving endorsement to acts that were made criminal by law.

Despite the decision of Justice Crosby, Mayor Schwab and the police are giving practically no support to the International in its efforts to rid the streets of jitneys. Traffic police are ignoring the jitney drivers who are racing up and down Main Street and the principal East Side thoroughfares. Private detectives have been retained by the International and with the aid of officers of the company evidence is slowly being obtained which has resulted in scores of jitney drivers being fined from $50 to $250 and more arrests will be made. The campaign will be continued by President Tulley and his associates until there is no more competition from jitneys.

Passenger travel over the local and interurban lines of the International has shown a big increase in the last week. Travel over the Park & River division of the company at Niagara Falls is normal and traffic on many of the West Side lines in Buffalo is normal. Few passengers are riding on the East Side, although there has been an increase of almost 50 per cent in the last week. The Buffalo-Lockport, Buffalo-Niagara Falls, Buffalo-Tonawanda and Buffalo-Depew lines are carrying a good quota of passengers.

Louisville Stockholders Approve Franchise Settlement

With about forty persons attending the stockholders' meeting of the Louisville (Ky.) Railway on Sept. 11 and 72,000 shares represented, some 65,000 shares by proxy, the agreement with the City Council for the new franchise ordinance was ratified. As a result the 6-cent ticket fare will become effective on Sunday, Sept. 17, provided the injunction is dissolved that was secured in the Federal Court some nineteen months ago, preventing the city from interfering with the company in the collection of the 7-cent fare. It is expected that action by the court will be quickly accomplished. Tickets or metal tokens will be sold at five for 30 cents, but cash fares will remain at 7 cents.

James P. Barnes, president of the company, said:

> Our attorneys and representatives of the city will go before Judge Walter Evans in Federal Court on Sept. 13 and make the necessary motions for withdrawal of the suit and modification of the injunction. What the motions will be, I am unprepared to say, as this is a matter to be determined by the attorneys. But there was complete accord among the directors that the plan of settlement as already agreed on by the city be accepted. So I am hopeful that beginning next Sunday, the new rate will be in effect.

Mr. Barnes announced that steps will be taken at once to work out with the Board of Public Works, the plans for expending $900,000 for improvements. These improvements will include the purchase of approximately eighty one-man cars; the installation of electrical machinery at its High Street power house of capacity sufficient to carry all of the present load; and to provide facilities for the comfort, convenience and welfare of its employees at car-houses and in shops.

The $900,000 is the excess accumulated by the company since the 7-cent fare became effective on Feb. 21, 1921, but which it was not permitted to spend because of the litigation over the fare question. The sum will not be added to the company's capital account, and hence will not be reckoned on its earnings against the barometer fund.

Electrification Plans Under Way by British Columbia Railway

The British Columbia Electric Railway, Vancouver, B. C., is electrifying six miles of steam railway connecting its Stave Lake Power plant with the Canadian Pacific Railway at Ruskin, B. C. The line is used mainly for hauling logs from the lake above, past the power plant and rapids. At present, the company is building a million dollar dam and the line will be used for hauling gravel from a point down the Stave River. Two steam locomotives have been used with a gasoline car for passengers. The voltage will be 550 and there will be one substation comprizing three transformers and one 400-kw. motor-generator set. Considerable saving in the cost of coal will be made.

As the plans of the company include a second plant on the river and the damming of the stream, the railway line will some time in the future be flooded and dismantled. Electrification work is therefore not entirely permanent. Electric locomotives now used on the company's interurban system will be transferred to the Stave Lake line.

Counsel for City in Utility Cases Resigns

Chester E. Cleveland, Sr., special counsel for the city of Chicago in charge of street car, elevated, and phone rate litigation, has resigned. In his note, dated Aug. 9, in which he asked to be relieved from duty on Sept. 1, Mr. Cleveland assigns no reason for wanting to step out of public service. Corporation Counsel Ettelson gave no explanation for Mr. Cleveland's action. His announcement of retirement from the city's service says only: "Chester E. Cleveland, having resigned as special assistant corporation counsel, will engage in the practice of law."

Minority Report Favored

Recommends Ten-Year Franchise Extension for Winnipeg Railway—Referendum Expected Soon

The franchise under which the Winnipeg (Man.) Electric Railway operates provides that in 1927—thirty-five years from the date on which it was originally granted—the city of Winnipeg shall have the option to purchase the railway property.

During the war and after the war period, the company, like practically every other public utility company, was unable to make large capital expenditures and from 1914 to the present time only a few extensions to the system have been made. Since taking charge of the property in the fall of 1917, A. W. McLimont, the vice-president and general manager, has made a great and successful effort to rehabilitate the property and to bring it into a high state of efficiency, which conditions consequent upon the first three years of war had impaired. For some time past the city authorities have been demanding of the company that it make a number of extensions to the system, calling upon it also to put its wires underground and to carry out certain other improvements which entail the expenditure of a large sum of money.

PROGRAM OF WORK OUTLINED

After considerable negotiations between the company's officials and a subcommittee of the City Council, an agreement was reached as to what was deemed necessary and expedient to do. The program of work outlined called for the expenditure of a considerable sum of money. The company found that owing to the uncertainty of the future it was necessary to provide some better security than it was in a position to offer, and, consequently, asked that the city defer to 1937 the right to exercise its option to purchase the property in 1927. This, it was pointed out, would permit the company to issue a security that would be salable and provide the necessary funds. When this proposition was made to the City Council it was referred to a special subcommittee. This sub-committee demanded certain concessions from the company before agreeing to consider the extension asked for, and the company replied with a proposition in which it stipulated the extensions to be made, the provision of motor bus service where necessary, and a promise to put into effect a sliding schedule of fares which, by Aug. 1, 1925, will put the whole system on a ticket fare of 5 cents. The proposed schedule was published in the *Electric Railway Journal*, Aug. 12.

Two of the five members of the subcommittee were in favor of the company's proposal and recommended to the Council in a minority report that the committee be instructed to continue the negotiations with the company and effect an agreement giving the ten years extension. It also recommended that the question of taking a referendum on the agreement be reported upon. The other three members of the committee opposed dealing with the company's application at the present time, suggested delaying action until the experience with municipal ownership in Detroit, Toronto, and Seattle had been thoroughly tested, and proposed that in the meantime the city of Winnipeg advance the railway company $1,000,000 to be spent on extensions. The proposal that the city should become the bankers for the company did not find favor with the majority of the Aldermen, and the recommendations of the minority committee were adopted.

Negotiations have again been resumed between the committee and the company's officials with a view to carrying out the instructions of the Council and drafting an agreement incorporating terms upon which the city will substitute the date 1937 for 1927. It has not yet been decided whether or not the agreement when finally passed by the Council will be submitted to the voters for ratification. There is a movement in the city that this should be done, but, on the other hand, the Council is desirous of getting the traction question settled as early as possible, in order that the company might start on some of its proposed work and thus provide employment throughout the winter and at a time when it is most needed.

The municipal elections take place in Winnipeg at the end of November and members of Council individually have expressed themselves as being opposed to permitting the traction question to become a political issue and for this reason it is expected that an agreement will be reached at an early date, and if it is submitted to a referendum the vote will be taken some time in October

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Mayor Couzens Scents a Conspiracy

In a statement made public a few days ago by Mayor Couzens of Detroit it was charged that a number of electric railways have employed private detectives to spread discontent among members of the Amalgamated Association now working for the Department of Street Railways. The statement was made, the Mayor explained, so that the city railway employees may not be misled.

The employees of the city who man the cars of the Municipal Railway are seeking a wage agreement. The Mayor explains that the city charter does not permit the city to recognize a union among the employees of any city department. The city has continued to pay the wage scale that was in effect when the local lines of the Detroit United Railway were taken over on May 15. This scale was fixed by a previous agreement between the Detroit United Railway and the men who have since become city employees.

As the Mayor sees it the effort which he says is now being made to stir up the local men has for its purpose creating discontent among platform men so as to, if possible, destroy municipal ownership of street railways as a policy. The Mayor's statement continued in part:

> The voters of Detroit have repeatedly shown overwhelming evidence that they are liberal and fair with city employees. There is no reason why any trade, division or occupation should be preferred over all other citizens. There is no more reason why an employment agreement should be entered into with the street railway men than with the policeman, fireman or employees of the water or lighting departments.
>
> We have treated our employees fairly and we did not reduce wages when wages were being generally reduced; a trial board has been established to investigate all complaints against employees, and it is our firm conviction that our employees will not be misled or discouraged by interested and selfish propaganda.

$100,000 Reward Offered

Rewards totaling $100,000 are offered by the International Railway, Buffalo, N. Y., for information leading to the arrest and conviction of the person or persons responsible for the dynamite outrages on its local and interurban lines since the strike of trainmen on July 1. Frank H. Gaskill, Philadelphia, head of the secret service of the Philadelphia Rapid Transit Company, who has been in Buffalo for almost a month, is in charge of the investigation. Private detectives from four nationally famous agencies are on the case.

The first reward offered by the International was $10,000, but last week this was raised to $100,000 by Herbert G. Tulley, president of the company, to stimulate interest in the investigation. Rewards commensurate with the value of the information received will be paid to those supplying facts helpful in effecting arrest and conviction of those damaging any other property of the International. The identity of those giving information will be protected and safe conduct out of the country will be given, if desired.

For information leading to the arrest and conviction of those responsible for the dynamiting of the high-speed Niagara Falls line at midnight Aug. 7, the company offers a reward of $20,000 and $10,000 will be given for information leading to the arrest and conviction of each of the other eight dynamite outrages, which were as follows:

East Ferry car at Fillmore Avenue at 12:30 a.m. on Aug. 18, high-speed Niagara Falls line at Gill creek bridge at 3:15 a.m. on Aug. 17, East Ferry car at Wohlers Avenue at 12:05 a.m. on Aug. 12, Fillmore and Delevan Avenue at 5:55 a.m. on Aug. 11, Elmwood Avenue and Middlesex Road at 9 p.m. on Aug. 9, Elmwood Avenue near State Hospital at 6 a.m. on July 30, Lockport line tracks between Hodgeville and Pendleton Center at 7:45 p.m. on July 28 and Cold Spring carhouse at midnight on July 19.

News Letter Appears.—The Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., is publishing a News Letter occasionally for circulation among its employees. The July 18 issue published some interesting company doings and in addition gave a few reminders to platform men on courtesy and safety.

Agreement Reached

San Diego Railway Relieved of Paving—Adams Avenue Line To Be Reconstructed

An agreement was reached on Sept. 14 between the City Council and the San Diego (Cal.) Electric Railway through the efforts of the State Railroad Commission whereby the Adams Avenue car line will be reconstructed at once and the company relieved of paving obligations. It was decided that the city will pave the balance of the street leaving a strip in the center with 2 ft. each side of the track for the company to fill with surfacing material not paving. General Manager Spreckels has announced that work will start at once on double-tracking Park Boulevard to the city limit with concrete ballast and twin steel ties and 93 lb. rails totaling two miles. This ends the controversy in San Diego the direct cause of which was the tearing up of the tracks by the company on Adams Avenue on Aug. 27.

CONTROVERSY OF LONG STANDING

The tearing up of the tracks by the railway came as a climax to a long series of squabbles with the City Council over paving matters. About 1 a.m. Sunday morning, Aug. 27, after the passenger traffic had ceased the railway rushed a car of tools and a gang of about 100 men to Adams Avenue, and with picks, shovels and jacks the work of tearing up the tracks was begun. About 5 a.m. the work was brought to a close when Mayor John L. Bacon, with a squad of policemen, arrived on the scene and ordered the workers to desist and arrested H. A. Kuehmsted, engineer of the railway company, who was directing the work, on a charge of tearing up the streets without permission. But in the four hours work about a mile of track had been torn up.

The following day the city of San Diego had secured a writ of mandate from the Superior Court of San Diego County ordering the company to restore its tracks and service at once or appear in court Aug. 30, at 10 a.m. and show cause why it should not do so. Likewise the City Council, at a special meeting, suspended the ordinance against jitney buses until the "emergency" shall be deemed to have passed.

The next step in the fight was the action of Judge S. M. Marsh, who in the Superior Court on Sept. 7 sustained the demurrer of the railway company to complaint of the city seeking a mandamus to compel the company to restore Adams Avenue tracks on the point that the city was not the proper party to bring action. Other points in the company's demurrer were not ruled on.

Attorneys Titus and Macomber, for the railway company, argued that the city had not stated sufficient facts for a cause of action, and challenged the jurisdiction of the Superior Court in the matter. Attorney Macomber for the railway contended that the city, as a municipal corporation, was not the proper party to institute an action of such nature and that it had not filed the proper kind of action.

Judge Marsh sustained the contention that the city was not the proper party to bring the action for a writ of mandamus, but did not rule on the other points in the demurrer and argument, saying it was unnecessary to rule on the other points after sustaining the demurrer on the one point.

In replying, City Attorney S. J. Higgins argued that since the city was the grantor of the franchise it had the right to regulate rates and service and cited decisions calculated to support his contentions. After the decision was rendered, City Attorney Higgins said he had not decided what course the city would pursue. He intimated that one of three courses was open—allow the matter to rest with the Railroad Commission, with which body complaint had already been lodged by citizens of the Adams Avenue district; file an amended complaint on behalf of the city, or start a new action with a taxpayer of the affected district as plaintiff.

In tearing up the tracks and abandoning service, Mayor Bacon claimed that the railway was acting illegally and violating its franchise contract. The Mayor and his friends asserted that the company could have delayed the paving matter until after the coming election by legal means had it so desired, instead of tearing up the tracks and discontinuing service.

Each side of the controversy accused the other of "playing politics."

The San Diego *Sun*, an afternoon newspaper, made the statement during the fight that the Council was determined to pave Adams Avenue, and that if necessary the railway's property would be seized to pay its share of the bill.

GENERAL MANAGER SPRECKELS EXPLAINS

Early in the fight General Manager Spreckels declared that the hand of the electric railway had been forced and that the tracks were torn up to protect the company against liability for paving Adams Avenue. Further, that his company stood ready to relay its tracks whenever assurance was given the company that it would not be required to bear any paving charges. In his statement to the public under date of Aug. 27 Claus Spreckels reviewed the history of the paving situation. He said that he had under instructions from John D. Spreckels, the president of the company ordered the abandonment of the line. He promised an adequate and efficient bus service operating on the same schedule as that of the railway in order that patrons of the Adams Avenue line would not suffer any inconvenience.

The day following Mr. Spreckels' statement to the public he sent a similar communication to the City Council stating that he had ordered the abandonment of the track and had made arrangements for transportation for residents along the Adams Avenue car line.

$5,000,000 of Assets Behind Amalgamated

W. D. Mahon, president of the Amalgamated Association, is reported to have said at the meeting of the American Federation of Labor in Atlantic City that in 1917 he had obtained a loan of $100,000 from a Boston bank to finance the street car men's strike in New York and that no collateral security was demanded. He is also reported to have said that the Amalgamated owns $5,000,000 of government securities. He is quoted as follows:

> When informed that the New York strike would collapse unless funds were made immediately available. I with other International officials took the train to Boston, obtained the $100,000 without difficulty, being told by the bank officials that they would accept our 100,000 membership organization as quick as an organization of employers or any other. We paid back this loan by an assessment of from $1 to $5 on the membership before $50,000 of the loan had been used up in the strike. The other $50,000 went to the union.
>
> Why should not banks loan to labor unions? Such loans are absolutely safe and secure. Our union, for instance, owns $5,000,000 worth of Government bonds and securities. We have considerable business with banks. The entire cost of the conduct of our international union, $225,000 a year, is paid out of the interest received on the bonds and funds on deposit. Not one cent of the assessments or dues from members is used for salaries or conduct of the international union.

Mr. Mahon's remarks were evidently prompted by comment appearing in the daily papers about loans made by the Harriman Bank in New York to officers representing the striking coal miners.

Arbitration Board Will Decide Wages

An arbitration board will decide the wages to be paid trainmen of the Boston & Worcester Street Railway, although no date has been set for the first meeting of the arbiters. The contract with the car men expired on Aug. 31. Thirty days previous to that date the company notified the employees and the employees notified the management that a change in the articles governing wages was desired. Several conferences were held previous to the expiration of the contract and it was agreed that all articles about wages were satisfactory.

The contract called for arbitration in the event that the company and the men could not agree and prescribed procedure for such arbitration. The old wage was 54 cents an hour; the company offered 52 cents. As they were unable to agree the company told the union it would arbitrate as prescribed.

At a meeting on Sept. 1, against the advice of their officers and the vice-president of the Amalgamated, the men refused to arbitrate and voted to strike at the end of work on Sept. 2 unless the company agreed to renew at the old wage. The men held several meetings during the three days strike, and on Sept. 5 decided to return to work on Sept. 6 and agreed to arbitrate if their officers and the company's officials could not come to a satisfactory agreement in reference to wages. In this case, as in all other cases of wage controversy, the old wage prevails until changed by agreement or arbitration.

Circulation Managers Have Direct Interest in Electric Railways

C. D. O'Rourke, circulation director of the *Journal* and the *Herald* at Dayton, Ohio, was one of the speakers before the members of the Ohio Circulation Managers in convention at Columbus a few weeks ago. The question which he put before the assembled members in the form of a paper was "How will we ship when the auto buses and trucks cause the elimination of the interurban and electric lines?"

In emphasizing some of the things with which he had to contend in his work in shipping newspapers over the electric lines Mr. O'Rourke said that near Dayton five spurs of main electric lines had been torn up within the last few years because the electric lines could not meet operating expenses in competition with the buses. He said that as a result all farm land values and small town real estate values along these electric railway lines had dropped. On a discontinued spur between Franklin and Lebanon the public would not stand for an increase in fare from 25 to 35 cents, but was now paying 75 cents to a bus line, and had to pay five times as much for freight haulage by auto as was paid previously to the railway.

On a discontinued line between Miamisburg and Germantown, the fare by bus is now 50 cents, while it was formerly 15 cents on the electric railway. He said that between Lebanon and Cincinnati no effort was now being made by the buses in service between these places to keep any regular schedule.

Mr. O'Rourke said that morning paper circulation managers should take time to look well into the financial condition of the electric railways. By far the majority of papers are sold to street car patrons. He presented for the consideration of the members in attendance a map on which he had marked the interurban lines which had discontinued service within the past few years, so that they could see just what it now meant to every one interested in newspaper distribution. It seemed to him that the electric railways and the interurban lines asked only that jitneys and buses be put on the same basis with the electric railways, and since the continued operation of the electric railways meant so much to newspaper men as a class, the newspaper men in turn should do everything within their power to help keep the electric railways running. He said that the local electric railway managers would gladly give facts and figures which show many reasons why all the newspaper publishers should be anxious to do all they could to prevent further abandonment of lines by the electric railways.

Usual Big Time at P. R. T. Picnic

Willow Grove Park teemed with good fellowship and rejoicing on Aug. 29 when the fourth annual picnic of the Philadelphia (Pa.) Rapid Transit Company took place. Besides, "a good time had by all" an amount of $10,000 was realized as a starter for the Helping Hand Fund which will be used as a beneficiary for needy employees.

There were so many P. R. T. picnicers that two days were necessary to give every employee an opportunity to attend. The days' events included musical features, athletic contests, etc., with the second day terminating in a dinner for officials and directors of the Co-operative Welfare Association at which Thomas E. Mitten, president of the company, explained what Mitten Management stood for and what it had striven to accomplish. Earlier in the day he delivered another address before the employees at which he said that the dream of his life was to see the employees not only operators but owners of the Philadelphia Rapid Transit Company's stock.

Weekly Pass for Chicago Elevated Approved

Slightly lower fares on the Chicago Elevated Railroad, including the company's plan to sell unlimited transportation on a weekly payment plan, were approved on Sept. 13 by the Illinois Commerce Commission and will become effective next Monday morning, Sept. 18. The commission has made the provision, however, that the pass may not be handed back at the turnstile to another member of the pass owner's party.

The new rate schedule, which provides for the sale of three tickets for 25 cents, instead of four for 35 cents, thus reducing the straight ticket fare from 8.75 cents to 8.33 cents, was explained to the commission at length by Gilbert E. Porter, attorney for the lines. The cash fare remains at 10 cents.

Most of the discussion among the commissioners revolved about the proposal to sell weekly transferable passes for $1.25, good between all points south of Howard Street and for $2 good between points in Chicago and points in Evanston. This plan is considered revolutionary because it has never been tried in American cities of more than 175,000 population.

An extensive advertising campaign to popularize the weekly passes is planned by the lines. Advertising matter already has been prepared and the first appeared in the newspapers on the morning following the approval of the plan by the commission. The officials hope the transfer feature of the passes and the fact that, in addition to their daily use in going to and returning from work, the purchaser or his friends may use a pass to go to the theaters, parks, the corner grocery store, or the downtown department store, will make it a good seller.

Among benefits which "L" officials urge in favor of the pass plan are that it will eliminate standing in line for tickets, with consequent speeding up of service, and that it will increase traffic in non-rush hours, thus increasing the number of short-haul passengers.

News Notes

Seeks Suggestions.—In an effort to secure constructive criticism from employees and passengers the Lincoln (Neb.) Traction Company has been issuing blank cards for service suggestions for its employees to fill out.

Seeks Extension.—Citizens of Van Zandt County, Tex., which has very little railroad mileage, are holding meetings and seeking to induce the Dallas Railway, which is completing an electric interurban rail line from Dallas to Terrell, thirty-one miles east, to extend the line through that county and to Tyler.

Wage Scale Continues.—As the result of an agreement between employees and management of the Birmingham Railway, Light & Power Company, Birmingham, Ala., the present wage scale will continue for another year or until Aug. 31, 1923. The vote taken by the men showed that they were in accord with the company's offer of allowing the present wage to continue.

Article Tells About Trailer Trains.—Trail trains and how far the Cleveland (Ohio) Railway has progressed in the development of adequate service for its patrons has been made the subject of an article in the July-August Ohio Brass Company Bulletin. The account was written by R. G. Averill, commercial engineer of the Ohio Brass Company. Reference is made in the article to statistics of train operation published in the *Electric Railway Journal*, issue of Oct. 2, 1920.

Seeks Mayor's Co-operation.—The Celebration Committee of the Frankford "L," the new line to be operated by the Philadelphia (Pa.) Rapid Transit Company, called on Mayor Moore recently to enlist the co-operation of the city in the program to mark the opening of the new line. After promising municipal assistance the Mayor forecasted other big rapid transit developments which would be speeded up as soon as the Frankford "L" was in operation.

Employees Have Good Courtesy Ideas.—The Georgia Railway & Power Company, Atlanta, Ga., operating the city's street car lines, in a recent contest awarded $100 in ten prizes ranging from $25 down to $5, for the best essays written by employees of the company and dealing with the manner in which courtesy between employees of a public utility and the general public might best be promoted. Many valuable ideas were found in the essays submitted in the contest, some of which the company expects to employ to serve this end. The first prize was won by C. F. Jones, a conductor, while three motormen and one other conductor were also among the prize winners.

Financial and Corporate

Surplus in Montreal

Tramways Realize $187,947 for Year's Operation—Statistics Under Present Grant Included in Report

The fourth annual report of the Montreal Tramways Commission to the city of Montreal has been made public. It contains statistics on the operation from 1921-1922 and a recapitulation from Feb. 10, 1918 (when the contract became effective), to June 30, 1922, "in order to ascertain the present situation." In the accompanying statement of operation it is noted that for the year ended June 30, 1922, a surplus of $187,947 was realized. In the previous years there were deficits and the interested parties, according to the report, in order to avoid an excessive rate of fare, have agreed not to exact immediate payment of the amounts due them.

It was in 1916 that the Montreal Tramways started negotiations with the city officials for additional and extended franchise rights. Opposition developed and finally led to the appointment by the provincial government of a commission to investigate the situation and draft a franchise, fair alike to the company and to the community served. The franchise recommended by the commission, with some modifications, was approved by the city and accepted by the company on Jan. 28, 1918.

The Montreal grant allows a 6 per cent normal return upon capital value. Upon new capital furnished by investors during the war or within two years after its termination an additional 1 per cent is allowed, but this supplementary return is wholly withdrawn within five years after the war. The railway also receives a further return to the extent of 20 per cent of the divisible surplus, the balance of the surplus going to the city (30 per cent) and the tolls reduction fund (50 per cent).

There is no restriction upon the use of the city or company allotments. The company is not permitted to pay dividends on its stock in excess of 10 per cent.

The Montreal grant also provides for two supplementary allowances, one of which is unique in franchise history. Thus there is a fixed annual sum, equivalent to one-half of 1 per cent of the initial capital value ($181,431) for the expenses of new financing, including printing and engraving, legal and registration fees, listings, etc. Any unused part of this allowance must be kept intact with interest accretions until the termination of the franchise, when it may be distributed.

STATEMENT OF OPERATIONS OF THE MONTREAL TRAMWAYS COMPANY

From Feb. 10, 1918, to June 30, 1922

	Feb. 10, 1918, to June 30, 1919	Ye r Ended June 30, 1920	Feb. 10, 1918, to June 30, 1920	Year Ended June 30, 1921	Feb. 10, 1918, to June 30, 1921	Year Ended June 30, 1922	Feb. 10, 1918, to June 30, 1922
Gross receipts	$11,572,210	$10,782,470	$22,354,680	$11,773,004	$34,127,685	$11,712,525	$45,840,210
Operating expenses and taxes	$6,640,715	$5,849,911	$12,490,627	$6,327,841	$18,818,468	$5,769,403	$24,587,871
Operating profit	45,927	46,606	92,534	47,442	139,976	47,959	187,936
Maintenance and renewals	2,098,120	2,190,557	4,288,678	2,529,054	6,817,732	2,579,200	9,396,932
Total	$8,784,763	$8,087,076	$16,871,839	$8,904,337	$25,776,177	$8,396,563	$34,172,740
Balance	$2,787,446	$2,695,394	$5,482,840	$2,868,667	$8,351,507	$3,315,961	$11,667,469
Allowance due company:							
6 per cent on capital value	$3,018,224	$2,177,177	$5,195,402	$2,177,177	$7,372,579	$2,177,177	$9,549,757
7 per cent on additions to capital	32,919	69,827	102,746	118,859	221,606	145,683	367,290
6 per cent on working capital	40,645	23,832	64,478	12,490	76,969	6,596	83,565
Financing expense	251,353	181,431	432,784	181,431	614,215	181,431	795,647
Total	$3,343,142	$2,452,269	$5,795,411	$2,489,959	$8,285,371	$2,510,889	$10,796,260
Balance, debtor	$555,695	$243,124 (a)	$312,571	$378,707 (a)	$66,136 (a)	$805,072 (a)	$871,209(a) (b)
Payable when earned:							
City of Montreal rental	$692,694	$500,000	$1,192,694	$500,000	$1,692,694	$500,000	$2,192,694
Contingent reserve fund	115,722	107,824	223,546	117,730	341,276	117,125	458,402
Total	$808,416	$607,824	$1,416,240	$617,730	$2,033,970	$617,125	$2,651,096
Deficit	$1,364,111	$364,700	$1,728,811	$239,022	$1,967,834	$187,947 (a)	$1,779,886

(a) Surplus.
(b) Total amount, payable to the city of Montreal, since the coming into force of the contract, on account of its rentals.

MONTREAL TRAMWAYS COMMISSION

Comparative Traffic Statistics from 1912 to 1922

Years from July 1 to June 30	1912–1913	1913–1914	1914–1915	1915–1916	1916–1917	1917–1918	1918–1919	1919–1920	1920–1921	1921–1922
Gross receipts	$6,754,227	$7,142,804	$6,525,231	$6,609,765	$7,725,498	$7,579,410	$8,645,547	$10,782,470	$11,773,004	$11,712,525
Revenue passengers	159,892,021	168,472,952	153,576,271	156,408,303	178,267,232	182,173,701	183,350,923	191,941,835	190,212,799	188,201,367
Car-miles	20,000,000	22,200,000	20,375,050	20,462,845	22,172,469	22,691,507	23,155,516	22,888,670	21,803,871	21,547,343
Total operating expenses	$4,032,664	$4,206,114	$3,713,996	$3,707,053	$4,601,771	$5,255,586	$6,669,340	$8,087,076	$8,904,337	$8,396,565
Net receipts available for payment of fixed charges and dividends	$2,721,652	$2,936,689	$2,811,235	$2,902,712	$3,123,727	$2,323,823	$1,976,207	$2,695,394	$2,868,667	$3,315,961
Gross receipts per revenue passenger, in cents	4.22	4.24	4.25	4.23	4.33	4.16	4.72	5.61	6.19	6.22
Gross receipts per car-mile in cents	33.7	32.2	32.05	32.26	34.90	33.40	37.40	47.11	53.99	54.36
Percentage of gross receipts devoted to total operating expenses	59.5%	58.9%	56.9%	56.1%	59.6%	69.4%	77.14%	75%	75.23%	71.69%
Operating and maintaining expenses per car-mile in cents	20.1	18.9	18.3	18.1	20.8	23.2	28.8	35.33	40.84	38.97
Net earnings per car-mile, in cents, for payment of fixed charges and dividends	13.6	13.2	13.8	14.2	14.1	10.3	8.52	11.78	13.15	15.39
Operating, maintenance and renewal expenses, in cents, per revenue passenger	2.52	2.5	2.42	2.37	2.58	2.88	3.64	4.21	4.68	4.46
Net earnings, in cents, per revenue passenger, for payment of fixed charges and dividends	1.70	1.74	1.83	1.86	1.75	1.28	1.08	1.40	1.51	1.76

Terms of East St. Louis Deal Announced

The conditions have been announced under which E. W. Clark & Company, have entered into an agreement with Dillon, Read & Company, representing the North American Company, for sale of preferred and common stock of the East St. Louis & Suburban Company, owned by E. W. Clark & Company. The agreement provides that all stockholders may sell their stock upon the same terms. The price is $55 per share for the preferred stock and $10 per share for the common stock, payable one-half in preferred stock of the North American Company at $50 per share and one-half in the common stock of the North American Company at $100 per share (the par value of both classes of stock of the North American Company being $50 per share).

The announcement of the impending purchase, made originally in the *Electric Railway Journal* of Sept. 9, has attracted much attention in financial circles everywhere, but particularly in the Central West where both sets of financial interests operate. In Columbus, Ohio, where the Clarks formerly operated, the impending deal has been treated at considerable length. On some of the more personal phases of the matter the *Ohio State Journal* of Columbus said:

> In January, 1919, W. H. Sawyer of Columbus, vice-president of E. W. Clark & Company, Management Corporation, accepted the presidency of the operating companies and undertook to salvage whatever was possible out of what looked to be and really was at that time a discouraging proposition. Columbus bankers, who know the situation, give Mr. Sawyer credit for bringing the operating properties to such a financial condition that the stockholders are now able to cash in on the present basis.

Eight Months' Traffic Increases

The Cincinnati (Ohio) Traction Company transported 330,169 more passengers during the eight-month period which closed Aug. 31, than during the corresponding period of 1921—the first time in five years that an increase in the business of the railway system has been shown. The total number of passengers for the eight months of 1922 was 71,282,908, against 70,952,739 in the corresponding time in 1921. Although the general report for the period is encouraging, W. Jerome Kuertz, Street Railroad Commissioner, in making comparisons for the month of August expressed himself as concerned with the falling off in the passengers carried as compared with July.

In August, 1921, there was an increase of 27,000 passengers over the preceding month. In August, 1922, however, there was a falling off of 99,000 passengers as compared with July.

Commissioner Kuertz attributes the drop to the numerous strikes and the consequent economic depression. However, the number of passengers carried last August was 123,801, greater than the number carried in August, 1921, the figures being 8,783,636 and 8,659,835. The railway patronage showed a steady increase from month to month up to and including July, when there was a drop.

Consolidation Matter Will Be Deferred

Bills to permit voluntary consolidation of the street railway companies of Washington into one corporation will not be considered by the House District of Columbia committee until the December session of Congress. Hearings on the several bills on this subject will be held early in the short session of Congress, according to announcement by the committee secretary.

It is probable that the House committee will shelve the House bills on consolidation and take up the two bills passed by the Senate, in order to expedite the legislation.

After having passed the one bill for voluntary consolidation, the Senate recently passed another, practically identical with the first excepting that it contains a special tax on income provision.

The tax provision was strongly urged by Senator Jones of Washington, who stated that two members of the House committee had assured him that the section would be carefully considered by that body.

A tax of 50 per cent on net operating income above 6 and not more than 7 per cent of the fair value and of 75 per cent above 7 per cent of the fair value is contemplated, in lieu of all other taxation excepting the ordinary real estate tax.

Financial News Notes

Interest on Bonds Paid.—The Third Avenue Railway, New York, N. Y., has announced an interest payment of 3¾ per cent on the adjustment mortgage fifty-year 5 per cent income gold bonds payable Oct. 1. This makes the total interest declared for the fiscal year 5 per cent.

Dividend on Account of Accumulations.—The directors of the New York State Railways, Rochester, N. Y., have declared a dividend of $6.25 a share on the preferred stock on account of cumulative dividends due on the senior shares. The dividend is payable Oct. 2 to stockholders of record of Sept. 27.

Seeks Abandonment.—The Michigan United Railway, Jackson, Mich., has petitioned the Public Utilities Commission for permission to abandon a 5-mile line between Frankenmuth and Frankenmuth Junction in Saginaw County. It is said that bus competition is responsible for the company's financial position.

Dividends Announced.—The Duluth-Superior Traction Company, Duluth, Minn., will pay on Oct. 2, 1922, two dividends of 1 per cent each on the 4 per cent cumulative preferred stock for the quarters ended June 30, 1921, and Sept. 30, 1921. In April, 1921, a dividend of 1 per cent was paid on the preferred stock.

Officers Elected.—Directors of the new Norwalk-Shelby Railway have elected the following officers: J. L. Baugh, Indianapolis, president and general manager; C. E. Heath, Plymouth, vice-president; A. D. Sanders, Norwalk, secretary; C. R. Irwin, North Fairfield, treasurer. The company will begin operating the line with gasoline cars about Oct. 1.

Valuations Announced.—The Pennsylvania Public Service Commission recently fixed valuations of two traction properties on petition of the companies for purposes of reorganization. The valuation of the Southern Pennsylvania Traction Company, Delaware County, has been set at $6,700,000 and of the Altoona & Logan Valley Electric Railway, Blair County, in the sum of $6,600,000.

Receiver for Interurban Named.—Judge Duval West, acting for Federal Judge Hutcheson in the United States Court at Houston, Tex., has named I. C. Griffith receiver for the Bryan & College Interurban Railway. The bill of complaint was filed by Louisiana bondholders, who claimed that $50,000 interest was overdue. Mr. Griffith is assistant cashier of the National Bank of Commerce.

Profits Increasing. — The Muskegon (Mich.) Traction & Lighting Company in a report filed recently shows that for the first time in more than two years both the electric railway and gas departments are showing a substantial profit. The profits for May, June and July in the traction department were $13,121. In addition the company paid $9,300 out of its earnings in interest charges.

Booklet on Public Service Corporation Issued.—Bonbright & Company, New York, have issued a booklet of forty-four pages on the Public Service Corporation of New Jersey. It contains a general description of the corporation, its properties and territory, with statements of the corporation securities and most of the securities of the subsidiary and leased companies Earning statements of many of the leased properties are given. The book is well illustrated with many halftones, charts and maps.

Merger Under Consideration. — The possibility of a merger of the Joplin & Pittsburgh Railway, an electric line, with the Northeastern Oklahoma Railway, has been announced by J. J. Heim, president of the Joplin & Pittsburgh line. Contemplated plans for an 11-mile link between Columbus, Kan., and Pitcher, Okla., would give the combined line a total mileage of 250 miles, in the heart of the coal and zinc fields of Kansas, Missouri and Oklahoma. The plans have been filed with the Interstate Commerce Commission for approval.

Traffic and Transportation

Operation of One-Man Cars Would Effect Operating Reduction

George F. Russell, superintendent of Public Utilities, which department operates the Seattle (Wash.) Municipal Railway, claims a reduction of $782,800 a year can be accomplished in the operation of the railway system by completely changing from two-men to one-man cars and that faster and better service will be afforded. This is a part of the program recently started by Superintendent Russell which he states will bring the city nearer to the return of the 5-cent fare.

Superintendent Russell believes that a reduction now from 8⅓ cents to 5 cents would cut off 33⅓ per cent of the revenues. The revenues for the first six months of the year were approximately $3,500,000, or at the rate of $7,000,000 for the year, and a reduction of 33⅓ per cent would bring the revenues under $5,000,000 for the year. He said that his company was working on the program of increased efficiency and reduced costs. One of the main items in reducing operating costs would be the replacing of the heavy two-men cars with one-man cars. An approximate reduction of $782,800 would be the result. Another reduction would be realized in the elimination of certain lines called "policy lines," where cars are operated far beyond a point necessary for efficient service. This would mean a reduction of $145,000, which with the $782,800 saving would put the company, in the opinion of Superintendent Russell, within striking distance of the 5-cent fare.

Bus Petitions Initiated

Initiative petitions in favor of an ordinance regulating the operation of buses in Pasadena, Calif., providing for the issuance of five-year permits and the granting of universal transfers on bus lines operated in Pasadena are being circulated for the purpose of being filed with the city directors.

The resolutions are fostered by the Federated Improvement Association of Pasadena calling on the city officials to submit to the public at a general election in November the proposition to regulate the bus lines. At least two propositions, one from the Pacific Electric Railway and the other from the bus operators, are asked for in the resolution adopted. The association is clamoring for competition in the bus field in order that there may be had the very best of transportation facilities.

The text of the resolution follows in part:

> Whereas some of the franchises of the Pacific Electric Railway on streets of Pasadena will expire at various times between the years of 1923 and 1944;
>
> Whereas said company seeks to renew its franchises and asks permits for the operation of bus lines to serve portions of the city not served by street railway lines;
>
> Whereas in addition to the service given by the Pacific Electric local street car lines in Pasadena, service is being given by a number of independently owned and operated bus lines;
>
> Whereas the bus lines are now operated under permits from year to year revocable at the will of the City Council; and
>
> Whereas these bus lines offer, if given a five-year permit, to operate in competition with the Pacific Electric Railway and to do the following things:
>
> 1. Give a 5-cent fare and agree to ask no more.
> 2. Grant a 3-cent fare to school children.
> 3. Grant universal transfers.
> 4. Practically double the bus service at once and add new lines as rapidly as the need arises.
> 5. Give a direct service to parks on holidays.
> 6. Give ten-minute service instead of all twenty-minute service.
> 7. Hold one bus in reserve for every three in operation, to provide against tie-ups due to accidents.
> 8. Form a co-operative company in order that the above betterments may be carried into effect.
> 9. Offer that the city may take over their business and equipment at any time for municipal purposes, by paying a fair price for it, same to be fixed by disinterested parties.
>
> That the permit asked for is for five years only, long enough to enable the bus lines to install better equipment, more frequent service and new service in portions of the city not now served, and yet not long enough to embarrass the city, should new or better methods offer themselves within that period.

The proposed ordinance sought for five-year term of bus line permits provides that the city directors may in their discretion deny applications, except when a permit request is accompanied by a petition bearing the signatures of at least thirty adult residents of the district to be served. In such an event the directors would be required by the terms of the proposed ordinance to grant the permit so sought.

Another feature proposed by the ordinance is the granting of universal transfers good on all bus lines in the city. It also provides that the city directors shall establish rules and regulations for the operation of motor buses that will not be inconsistent with the ordinance.

Fare Fight in Court

Testimony of City of Fort Worth Heard to Compel Northern Texas Traction Company to Reduce Fares—Seven-Cent Fare Pending Referee's Report

The fight of Fort Worth, Tex., to compel the Northern Texas Traction Company, which owns and operates the street car lines in Fort Worth, to reduce its fare from 7 cents to 6 cents or possibly 5 cents is now before N. A. Dodge, referee appointed by the Federal Court to hear testimony on points involved and make report of his findings to the court. Hearing was held in Fort Worth last week before the referee in which the city presented testimony in support of its claim that the traction company is earning more than a justified return on its investment and that a reduction in fares is warranted at this time.

The Northern Texas Traction Company has been operating under a franchise similar to that under which the Galveston Electric Company was operating when its case was carried to the Supreme Court for decision. The Fort Worth case was very similar and officials of Fort Worth did not push their fight until the decision was rendered in the Galveston case. The Fort Worth franchise gives the traction company the right to fix fares so that a fair return shall be earned on the invested capital, and the only recourse the city has to prevent overcharge in fares is to go into court and show that fares are higher than justified. The traction company raised its fares to 7 cents. Thereupon, the city passed an ordinance directing the traction company to reduce fares to 6 cents. The ordinance was ignored, and the city went into court to compel a reduction. The hearing just concluded is to determine if the city's order calls for a fare that is confiscatory in that it fails to provide adequate return on the invested capital of the traction company.

Numerous points were developed in the hearing and street car service in Fort Worth was compared with similar service in other cities where fares are lower. Invested capital, replacement values, depreciation, and other factors to be considered in rate making were developed at the hearing. The traction company presented its side of the question before the referee several months ago, and the hearing this time was devoted to a presentation of the claims of the city.

H. P. Gillette of Chicago, editor of *Engineering and Contracting*, was placed on the stand as a witness for the traction company. Mr. Gillette declared that the Northern Texas Traction Company is warranted more at the present time in charging a 7-cent fare than in 1920. The valuation of the company's properties in Fort Worth now is $9,133,913, Mr. Gillette declared, as against a valuation of $11,575,513 in 1920. In response to the direct question of "What would happen to the traction company if the car fare had been reduced to 6 cents during the last fiscal year?" Mr. Gillette declared that the company would be facing a deficit of $23,000 at this time, because the 6-cent fare would have been inadequate to pay the operating costs if service is to be maintained at present standard.

The witness cited figures to show that the traction company during the last year earned 2.58 per cent on its valuation, whereas it has been held by Federal Courts in similar cases that a public utility of this kind should be permitted to earn a return of 8 per cent. An increase to 8 cents or 9 cents is more justified than a reduction to 6 cent or 5 cents, he said.

The standard of service maintained

in Fort Worth as compared with service maintained in other Texas cities was an important factor in the hearing and much testimony centered about this point. During the year ending Oct. 1, 1921, the traction company served 28,248,000 passengers, he said, whereas during the year ending June 1, 1922, it had served only 25,809,000 passengers, a decline of more than 10 per cent. This means a reduction of more than 10 per cent in revenues, he said.

The one-man car proved a bone of contention in the hearing. This car is operated extensively in Fort Worth and on some lines the patrons have objected strenuously. The cars were first tried out in Fort Worth in 1915, when ten cars were placed in service. Since that time the one-man car has proved its superiority over the larger cars in economical operation, Mr. Gillette said, and there are now more than 4,600 in operation in this country.

EXCESS SERVICE MAINTAINED

Joseph M. McShane, testifying as an expert witness for the city on the question of standard of service, asserted that the traction company in Fort Worth is maintaining 34 per cent more efficient service than it maintained in 1919, and that the net returns under the 5-cent fare in 1919 amounted to more than the net return in 1921 under the the 7-cent fare. This condition he attributed to an excess in service maintained. Curtailment of service would permit the traction company to reduce fares to 6 cents or even to 5 cents he asserted without lowering the net revenue. Testimony of Mr. McShane was attacked by W. E. Tucker of Boston and Sam B. Cantey, Fort Worth, counsel for the Northern Texas Traction Company, and the witness was forced to admit that his study of the operation of the Northern Texas Traction Company had been somewhat cursory. He also was forced to admit that his assertion that the company is maintaining 34 per cent excess service was in error, that the real excess should be stated at about 25 per cent.

George H. Clifford, general manager of the Fort Worth traction lines, took the stand on the closing day of the hearing. Mr. Clifford admitted that the service maintained in Fort Worth is superior to that maintained in Dallas and in other Texas cities. Mr. Clifford said that Mr. McShane in comparing service rendered under the 7-cent fare with service rendered prior to that, had taken 1919, which was the greatest year in the history of the traction company in regard to passengers carried, and had compared that year with 1921, which was the poorest year in the history of the company when measured by actual net returns.

The city attacked the contract between the local traction company and the interurban under which the traction company is paid 2½ cents per mile for use of its lines within the city limits by the interurban company.

A report by the referee to the court is not expected for a period of sixty days or longer, as attorneys for both sides are given thirty days in which to file written briefs, and the referee is expected to take at least thirty days for an examination of these briefs and formulation of his report. In the meantime the traction company continues to collect a 7-cent fare.

Weekly Pass Meeting with Favor in Washington

Figures presented by the Puget Sound International Railway & Power Company, Everett, Wash., show that its weekly pass plan is meeting with the approval of the riding public. The records show that 10,204 through pass rides were enjoyed the first week by the public for the sum of $404, or an average fare of 3.96 cents. Somewhat larger sales and equal approval are reported by the Bellingham lines, which also sell the pass at $1. While the cash fare in Everett is 10 cents, almost everybody used four tickets for 25 cents before the pass came. In Bellingham the cash fare is 7 cents and tickets are sold at fifteen for $1, the ticket sales, however, being small on account of the amount required for purchase.

Hearing on Railway Application for Bus Permit

The State Railroad Commission of California will hold a hearing in San Diego on Sept. 15 on the application of the San Diego Electric Railway for a permit to operate an auto bus line as a feeder to the San Diego-National City-Chula Vista interurban railway line. If granted, the company will establish its bus line over a route about 5 miles in length, connecting with the interurban street railway at Eighth Street and National Avenue, National City. It is planned to maintain a fifty-minute schedule except for one hour each morning and evening, when the three Fageol buses to be placed on the run are used in taking from and returning to their homes students of the new Sweetwater Union High School, which has just been completed.

The new bus line would supplement the present railway service.

Lower Fare in Providence Under Consideration

The board of directors of the United Electric Railways, Providence, R. I., recently authorized President Potter to file with the Public Utilities Commission special rates for school children eighteen years or under. The new plan, by which tickets would be sold in strips of ten for 40 cents, will mean a reduction in fare amounting to 2 cents. The tickets will be good for riding to and from school and will carry the same transfer privilege as the cash fare.

Mr. Potter said that a survey was being made in Providence of fare systems. He added, however, that he did not believe his company would adopt the pass system.

Offers Five-Cent Fare

A Cut of Two Cents in Regular Fare Proposed by Newport News Railway Head

With a view of doing the greatest good to the greatest number the City Council of Newport News, Va., has approved the plan of J. N. Shannahan, president of the Newport News & Hampton Railway, Gas & Electric Company, to put into effect as soon as possible a universal 5-cent fare. The present fare is 7 cents with half-price work and school tickets. It is expected that the new fare schedule will meet with the approval of the State Corporation Commission. Six weeks will be needed to take care of the legal requirements involved in changing the franchise.

Mr. Shannahan stated that the reduction will be put into effect in every zone on the peninsula. He submitted figures to show that 76 per cent of the peninsula's traveling public will have their car fare reduced 2 cents while about 21 per cent will have it increased 1½ cents. He frankly stated that he did not know whether his company could "get by" on the arrangement but was willing to give it a trial, hoping to secure more riders at the reduced rate.

Members of the Council declared that they believed the men and women who lose the half-price work ticket will benefit in the end as a result of the flat 5-cent fare, they and members of their families having to use the cars at times when the reduced fare does not apply.

In opening his statement of the practicability of the straight 5-cent fare, Mr. Shannahan stated that he had studied the matter from all angles and that the fare could be had in only one way, the establishment of a universal fare at this rate. He could not make special labor and school rates and have his company remain solvent. He added that he was willing to try the straight fare and make reports to the Council. In answer to a question he stated that the average fare is 6.11 cents and that the only way to make up for the loss of revenue is to carry more passengers.

The percentage of fares was then brought out, showing that labor tickets are but 18 per cent of the total number of fares.

In regard to the reduction President Shannahan said that it would be impossible for the company to give this reduction without the ordinance recently passed regulating the use of the city streets by jitneys and buses.

Under the plan not only would the fare within the city limits be reduced to 5 cents, but the fare on the interurban lines would be lowered also. The fare to Hampton would be 10 cents instead of 14 cents and the fare to Old Point and Buckroe would be 15 instead of 21 cents.

Appreciation of Mr. Shannahan's offer was expressed by the Mayor and by members of the Council. Councilman Smith characterized the plan as a "clean-cut" proposition and that the only question was whether the people of the city wanted a 5-cent fare.

Recommends Drastic Changes in Traffic Regulation

In co-operation with the Los Angeles Traffic Commission the Automobile Club of Southern California has just completed an extensive study and report on its plan for relieving congestion in the city of Los Angeles. The principal measures recommended include the widening of city streets and the elimination of cars from some of the downtown streets. The report states that if traffic congestion continues after making drastic changes then all cars should be removed from the downtown congested area and a belt line or loop system of railways should be built. The report was filed on Aug. 30 and copies were submitted to the Board of Public Utilities, City Planning Commission, Chamber of Commerce and other civic bodies.

The report contains a map showing the location of the proposed new streets and charts showing the population curve and other causes of congestion, also extensive information concerning the manner of dealing with traffic problems in other cities. The report of the club was prepared by its consulting engineer, J. B. Lippincott. It consumed one year to prepare the completed report, with the engineer in charge using forty assistants.

Weekly Pass in Pine Bluff

Another railway announced recently its intention of putting into effect the weekly pass plan. This is the Pine Bluff (Ark.) Company, which started on Sept. 4 the selling of $1 passes good for an unlimited number of rides between Monday morning and Sunday night. The plan also provides that school children may enjoy the same privilege for 50 cents a week, provided they are able to present certificates showing that the students are bona fide pupils in the public or private schools. The new plan will make no change in the cash fares, which will remain at 6 cents a ride.

Hearing Set on Suit of Puget Sound Property

Preliminary to the litigation in Federal court this fall, which is expected to have a bearing on the adoption of a 5-cent car fare for the Seattle (Wash.) Municipal Railway, the city recently filed with the Circuit Court of Appeals in San Francisco its brief in the so-called "specific performance" suit brought by the Puget Sound Power & Light Company. Hearing has been set for Sept. 18, when the high tribunal will sit in Seattle.

This is the case in which Federal Judge E. E. Cushman in the District Court rendered a decision favorable to the power company, which was seeking to have the general fund of the city made security for the $15,000,000 of bonds with which the street railway was purchased from Stone & Webster. Since that decision the State Supreme Court has interpreted the statutes of this State as forbidding any invasion of the city's general tax funds for the purpose of operating and maintaining the street car system, and the city had appealed from the decision given by Judge Cushman. The city will be represented by Corporation Counsel Walter F. Meier, T. J. L. Kennedy, first assistant, and Robert H. Evans, special counsel.

Fare Dispute in Dallas

Petition to Mandamus City to Compel Reduced Fare—Appeal Against Six-Cent Fare Collection

The fight to compel the city of Dallas, Tex., to reduce fare by repealing the ordinance granting an extension of the 6-cent fare to the Dallas Railway has found its way into the courts. Two petitions are now pending, one seeking to mandamus the Mayor and City Commissioners to compel them to act on the petition filed on July 24 asking that the ordinance granting the extension of the 6-cent fare be submitted to the qualified voters of the city for approval or rejection under the referendum provision of the city charter.

The legal department of the city of Dallas had held that the fare extension ordinance carried an emergency clause and under the charter provisions is not subject to referendum. The petitioners seeking the referendum, on the other hand, allege that there was no emergency and that the fare extension ordinance should not have carried the emergency clause but should have become effective only after the regular period of thirty days.

SEEK TO ENJOIN COMPANY

The other petition seeks an injunction restraining the officials and agents of the Dallas Railway from collecting 6-cent fares, or any other fare than the 5-cent fare provided in the original franchise granted to C. W. Hobson and his associates in 1916. The latter petition has just been filed in the district court by the same petitioners as filed the former petition with the City Commission and later filed petition for mandamus to compel the City Commissioners to act on their petition.

The petition seeking an injunction cites provisions of the original franchise and alleges that any action by the city in increasing fares except as provided in that franchise was in violation of law and void. The petition further asks that in case the 6-cent fare is not immediately set aside, the court order the Dallas Railway to issue receipts for fares paid by its patrons so that in case the 6-cent fare is set aside later the patrons may secure refund of excess fares paid.

W. M. Holland, president of the Dallas Railway, and Richard Meriwether, vice president and general manager, are named in the petition as agents of the defendants.

The petition also asks the court to compel the defendants to deposit the amount of the monthly difference between the 5-cent and the 6-cent fare if the order for a temporary injunction is not given by the court, and designates the difference between the two rates of fare as $500 a day. The claim that the 6-cent fare is being collected illegally is repeated in the petition.

The petition also cites that the 6-cent fare ordinance would not go into effect legally until it had been voted upon by the electors of the city of Dallas, in conformance with the charter, because a scale of 5-cent fares is designated under the original Hobson franchise, which was voted upon by the people.

Will Seek Review of Commission's Fare Order

The city of Alhambra, Calif., served by the Pacific Electric Railway lines, is preparing to go before the Supreme Court and charge the State Railroad Commission with unfair discrimination. Alhambra has taken exception to the recent ruling of that body which reduced the fare to South Pasadena and has ignored the claims of Alhambra for a similar reduction, although the mileage to Alhambra is considerably less than to South Pasadena. T. C. Gould, city attorney, has announced his intention of asking legal representatives of other cities adjacent to Los Angeles to join with him in requesting a writ of review. The commission ruling which reduced Hollywood and South Pasadena fares was reviewed in the *Electric Railway Journal* issue of Sept. 9.

Transportation News Notes

Weekly Pass Plan in Effect.—The Pacific Power & Light Company, Astoria, Ore., began on Sept. 4 issuing weekly passes on the railway lines at $1 each, good for an unlimited number of rides by the holder during the seven days following the issuance. This company is the first in Oregon to adopt this plan.

Wants to Restrain Buses.—The Mayor of Houston, Tex., has indicated that he will secure submission to the voters in November of a proposal to prohibit the operation of jitneys in that city. Electric railway facilities have recently been increased by the expenditure of more than $1,000,000 by the Houston Electric Company.

Plea for Permanent Transfer Points.—Electric railway companies of Dayton, Ohio, have requested the City Commission to curtail transfer privileges. It is alleged that the transfer privilege is being abused. Permanent transfer points are being sought. Railway officials claim that in some cases it is possible for a person to go downtown on one line, get a transfer and reach home on another for a single fare plus a 1-cent transfer charge.

Personal Mention

Mr. Shryock Advanced Again

E. O. Shryock, who was recently appointed superintendent of the light, power and transportation departments of the Columbus, Newark & Zanesville Traction Company at Zanesville, Ohio, has a long service record in electrical utility work behind him.

In June, 1906, he was employed by the Meadville Traction Company, the Meadville & Cambridge Springs Street Railway and the People's Incandescent Light Company, which were jointly operated. While in their employ, he was connected at various times with practically every department. In February, 1909, Mr. Shryock was made superintendent of a new division then being operated under the name of the Meadville & Conneaut Lake Traction Company, holding this post until 1913, when these companies were consolidated under the name of the Northwestern Pennsylvania Railway and the Northwestern Electric Service Company. At this time he was made superintendent of transportation of the Meadville-Cambridge Springs Division, Meadville Division and the Meadville and Conneaut Lake Division.

Later in 1913 the Erie Traction Company was consolidated with these companies and Mr. Shryock was made superintendent of transportation and purchasing agent for the combined systems. In the following year he was promoted to be general superintendent, which position he held until 1920, when he resigned to become superintendent of railways of the Northwestern Ohio Railway & Power Company, with headquarters at Oak Harbor. This position he resigned in June, 1922, to become superintendent of transportation of the Columbus, Newark & Zanesville Traction Company at Zanesville. He was promoted to the general management of the company's local properties on Sept. 1 when the resignation of B. S. Watters went into effect.

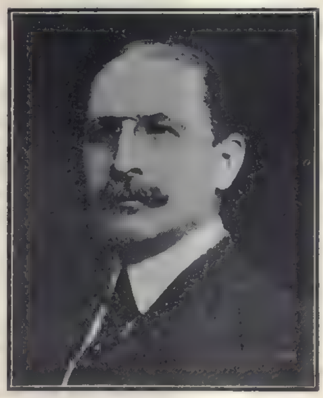
Spanish Railway Officials Visiting Here

Señor Don José Moreno Ossorio, general manager of the Norte Railway in Spain, and several other Spanish railway experts who are working out plans for the proposed electrification of the Norte Railway recently made a tour of inspection through the East Pittsburgh works of the Westinghouse Electric & Manufacturing Company.

The other members of the inspection party were Don Mario Viani Caballero, chief engineer of the motive power department, Norte Railway; Prof. Don José A. Pérez del Pulgar, professor of electrical engineering Instituto Católico de Artes e Industrias, and R. F. Hamilton, consulting engineer of the Sociedad Española de Construcción Naval, which represents the Westinghouse Electric International Company in Spain.

The initial electrification on the Norte system, which is one of the largest in Spain, will include about 40 miles of line running from Ujo through the mountainous Pajares section in the north. Three thousand volts direct current will be used in this section, and water power will be purchased from the Electra de Viesco Company in Asturias. More extensive electrification work is planned for the future of the Madrid-Venta de Baños section of this Spanish railroad.

John E. Wilkie Assists General Manager of Chicago Surface Lines



J. E. WILKIE

John E. Wilkie, a vice-president and director of the Chicago (Ill.) Railways, is made assistant general manager of the Chicago Surface Lines under a new organization plan. His department, in addition to handling routine matters of the general manager's department in the absence of that officer, will have charge of publicity and public relations, real estate transactions and records and all complaints relating both to service and personnel.

By thus placing in the control of one executive the reception and adjustment of complaints both as to service and employees, the management recognizes the importance of these features of public relations as affecting the reputation of the company with its patrons. It also assures a co-ordination of effort between the complaint and transportation departments, which it is hoped will work to the decided advantage and profit of the company. Mr. Wilkie is a former newspaper man who, for sixteen years before joining the forces of the Chicago Railways in 1913, was chief of the Federal Secret Service in Washington.

E. R. Kelsey Resigns at Toledo

Edward R. Kelsey, for twelve years in charge of the publicity department of the Doherty company, has resigned. He will become scout executive for Toledo, Ohio. Mr. Kelsey was a newspaper reporter before 1910, devoting part of his time to the interests of the Toledo Railways & Light Company. In 1910 he left newspaper work to become manager of the publicity department at Toledo. In 1912 he was appointed general passsenger agent.

W. B. Yereance has completed his contracts with the Eighth and Ninth Avenue Railroad companies, New York, and has relinquished his office of general manager and chief engineer of those properties.

R. F. Clute has been appointed supervisor of the Charleston Consolidated Railway & Lighting Company, Charleston, S. C. He succeeds A. H. Roberts, who resigned recently. Mr. Clute has been an inspector and dispatcher for the company for several years.

Edward Roach is in charge of the installation of the electrical equipment on the lines at Muncie and Anderson, Ind., of the Union Traction Company of Indiana. Bradford Fields is in charge of the installation of the high-tension lines under construction between the Muncie substation and Eaton power plant and between the Muncie and Selma substations.

C. H. Evenson has been appointed assistant general superintendent of transportation of the Chicago (Ill.) Surface Lines. Mr. Evenson entered the service of the Chicago City Railway in 1910. For a number of years he was secretary to the president of the Surface Lines and for the past two years has been employed in the transportation department.

Paul Warwick has been appointed assistant director of the public relations department of the Georgia Railway & Power Company, Atlanta, Ga. The change is effective Sept. 1, according to an announcement by Lincoln K. Starr, director of the public relations department. Mr. Warwick, who has been secretary of the Georgia Committee on Public Utility Information, was formerly Mr. Starr's assistant with the Georgia company. He succeeds "Fuzzy" Woodruff, who has held the position the last several months and who resigned to take up newspaper work again.

J. M. McElroy, one of the leading tramway authorities in Great Britain, has been presented by the Manchester Tramways Committee with a silver tea service on the occasion of his retiring through ill health as general manager of Manchester Corporation Tramways, a post which he has held for twenty-two years. The chairman of the tramways committee and the Lord Mayor of Manchester bore high testimony to the value of the work accomplished by Mr. McElroy, voicing the sorrow of all concerned that it was necessary for him to retire.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Pulverized Coal Installations on Increase

One Manufacturer of This Class of Equipment Reports Record Orders, Which Include Many Converts in the Electric Railway Field to Use of the New System

EVERY utility is interested in anything that has to do with the use of coal. In the operation of the power plant, the first problem just now happens to be how to get the coal to burn. That is a temporary or passing condition, however, so that, after all, the problem resolves itself into what coal to get and how best to use it after the coal has been purchased. At first, the criterion was to get as good coal as possible and then to burn it as economically as possible, but with coal prices at their present level and the prospects very remote of any very large decrease in the price of fuel, increased attention is being paid to the possibilities contained in the use of low-grade fuels with mechanical means called upon as an aid to securing better power station results.

PULVERIZED FUEL EFFECTS OPERATING ECONOMIES

It is just here that pulverized coal has forced its way to the front as a possible aid to economy when properly used. At least one large utility plant has been built entirely with the end in mind of using pulverized fuel, and the tendency has been constantly growing among other power users to turn toward the use of coal in pulverized form. In the particular case to which reference has just been made the installation contemplated that the utility should pulverize its own coal in its own plant, but this was merely an incident in the operation and if anything emphasizes the advantages of the use of the pulverized fuel.

No matter what the coal market conditions or technical considerations may be that govern this tendency, the fact that more and more companies are turning toward the use of pulverized fuel is a development too important not to merit very serious consideration everywhere. Among the latest converts to the use of pulverized fuel are the United Electric Railways, Providence, R. I.; the West Penn Traction Company, Pittsburgh, Pa.; the Rochester Railway & Light Company, Rochester, N. Y.; the Duquesne Light Company, Pittsburgh, Pa., and the Union Electric Company, St. Louis. All of these companies are on record as having placed orders recently with the International Combustion Engineering Corporation for the installation of the Lopulco system, and that company reports bookings for combustion equipment during August for more than $900,000, exceeding by more than $200,000 the record of any previous month. This is the recent record of just one manufacturer of this class of equipment.

INSTALLATION IN MILWAUKEE SUCCESSFUL

The Philadelphia Rapid Transit and the Milwaukee installations for burning pulverized coal, described previously in the *Electric Railway Journal*, are of course among the most important of the kind so far made in the public utility field. The significance of the results of the Milwaukee installation in particular is doubly important as the installation there has apparently more than justified the faith of its sponsors, for among the latest companies recorded as turning toward the use of pulverized fuel is found the Union Company, also a subsidiary of the North American Company along with the company at Milwaukee.

Thus is the record set down of a tendency among power users that seems to have great impetus behind it. Therein may lie a lesson for power uses elsewhere. As for the company making the equipment, the intending purchaser may not be interested in the extent to which the producer is prospering because all his plants are now being run to capacity, but even that fact is not without significance for the power user, although he may not be interested in the details of the figures of the manufacturer's output. In the case of the International Combustion Engineering Corporation this output includes also the products of the Underfeed Stoker Company.

$3,000,000 Power Development Planned

The Potomac Public Service Company, which purchased the Hagerstown & Frederick Railway, together with holdings at Eddes Fort along the Cacapon Creek in Morgan County, West Virginia, will erect a hydro-electric station, costing about $3,000,000. The company hopes to supply power within a radius of 75 miles of the plant.

A dam will be built at Eddes Fort, which will impound water that will drain an area of 672 square miles. The lake will flood an area of 5,000 acres. It will be 165 ft. high from the bed of the creek.

The company has secured options for a distance of 30 miles or more. It will require two years to complete the work. The setting of the lake in the natural woodland will no doubt result in the formation of a summer colony along its banks.

Inasmuch as many miles of the country road will be flooded, the company will provide a highway of concrete the whole length of the lake. The large dam will be of concrete construction and will be more than 700 ft. in length at the crest. The company will develop approximately 30,000 hp. High-tension transmission lines will be built to connect the company's lines over four states.

Westinghouse Company Receives French Railway Contract

An order covering the complete control equipment for 120 electric locomotives, now under construction, has been received by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., from the Paris-Orleans Railway of France as part of an electrification contract amounting to approximately $8,000,000.

The Paris-Orleans Railway, which is one of the largest systems in France operating over 5,000 route-miles of track, is electrifying 125 miles of its main line between Paris and Vierzon. This is the first of an extensive program laid out by the Paris-Orleans for the electrification of its lines.

The complete order of control equipment will be manufactured in the United States and shipment of this order will commence in January, 1923, and extend to December, 1924.

Rails Will Cost More

The United States Steel Corporation announced on Sept. 13 that the price of standard steel rails would be advanced from $40 to $43 per gross ton on Oct. 1.

This is the first advance made in the prices of rails for many months and is accepted as marking the beginning of the resumption of the upward trend in prices.

Formal announcement made by the corporation said:

Until Sept. 30, 1922, the price of standard rails will continue to be $40 per gross ton base f.o.b. mills for deliveries to be made in about equal monthly instalments prior to June 30, 1923. Commencing Oct. 1, 1922, the price will be increased to $43 per gross ton base f.o.b. mills for same deliveries.

Metal, Coal and Material Prices

Metals—New York	Sept. 12, 1922
Copper, electrolytic, cents per lb.	14.00
Copper wire base, cents per lb.	15.625
Lead, cents per lb.	5.90
Zinc, cents per lb	6.70
Tin, Straits, cents per lb.	32.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$8.375
Somerset mine run, Boston, net tons	5.125
Pittsburgh mine run, Pittsburgh, net tons	4.625
Franklin, Ill., screenings, Chicago, net tons	4.375
Central, Ill., screenings, Chicago, net tons	4.325
Kansas screenings, Kansas City, net tons	2.75
Materials	
Rubber-covered wire, N. Y., cents per lb.	6.25
Weatherproof wire base, N.Y., cents per lb.	16.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N.Y., cents per gal.	91.50
White lead, (100-lb. keg), N.Y., cents per lb.	12.50
Turpentine, (bbl. lots), N.Y., per gal.	$1.29

Rolling Stock

New York & Queens County Railway, New York, N. Y., has leased fifty cars of the Third Avenue Railway. These will replace some of the bad order equipment of the Steinway lines operating in Long Island City.

Boston (Mass.) Elevated Railway placed an order during the month of July for forty steel cars of the elevated type for operation in train service in the East Boston tunnel upon completion of the Maverick Square Terminal.

Louisville (Ky.) Railway, now that the new franchise ordinance has been finally arranged, is expected to purchase about 80 one-man cars under the plan calling for the expenditure of $900,000 in improvements.

Chattanooga, Tenn.—The first gasoline motor car will be placed in operation out of Chattanooga by the Tennessee, Alabama & Georgia Railway. The car was purchased from the Service Motor Truck Company, Wabash, Mich. For the present the motor car will make a round trip to Gadsden and will be run on the same schedule as the steam passenger trains.

The Cincinnati (Ohio) Traction Company has ordered seventy motor and control equipments for new cars from the Westinghouse Electric & Manufacturing Company. The outstanding feature is the application of Westinghouse cabinet type control, which simplifies the operation of cars. This type of control was first tried out successfully in Cleveland, Cincinnati being the second city to adopt it. The seventy cars are being built at the plant of the Cincinnati Car Company.

Track and Roadway

Cincinnati (Ohio) Traction Company will order at once the necessary material for the installation of tracks and switches in connection with the rerouting plans.

Trenton & Mercer County Traction Corporation, Trenton, N. J., is making a number of improvements to the roadbed at Hopewell, N. J., and raising the rails at several points.

Muskegon (Mich.) Traction & Lighting Company is placing its profits in improvements to the line. The work of double-tracking the line in the business section of the city has been completed.

Toronto (Ont.) Transporation Commission has commenced work on the double-tracking of Yonge Street from Woodlawn Avenue to the northern city limits. The street will then be paved.

The Connecticut Company, New Haven, Conn., through President Storrs has notified the Mayor of Hartford that it is ready to lay its share of the pavement on Windsor Avenue. New rails and roadbed will be laid. The expenditure will approximate $75,000.

Eureka (Calif.) Street Railway has materially improved its roadbed since January of this year. The rails have been straightened out, new ties used and trolley wires replaced. The cars have been remodeled and rebuilt and a new rotary converter has been installed.

Fresno (Cal.) Traction Company will likely begin work on its $85,000 extension program on Oct. 1. E. A. Devereux recently announced the arrival of ten car loads of rail and a large quantity of ties to complete the extension of Adlington Heights and the Fresno Avenue extension.

Columbus, Delaware & Marion Electric Company, Marion, Ohio, may build a new belt line in Marion. It became known that the company bought a right-of-way 20 ft. wide in Uhler Road in Vernon Heights addition. In case the company builds a belt line the Center Street line will be used as a feeder, it is said.

Pacific Electric Railway, Los Angeles, Cal., was authorized by the California Railroad Commission to construct three tracks at grade across Pico Avenue and the Southern Pacific Company to relocate its railroad track across Pico Avenue in Long Beach. The changes follow a relocation of the industrial district of Long Beach.

Dallas-Terrell. — Extension of the Dallas-Terrell line of the Texas Interurban Company, to Mineola and Tyler which is expected to be placed in operation before the end of 1922, is being sought by commercial interests of these and other East Texas cities and towns. The matter has been placed before the officials of the companies interested in building the new interurban line.

Groton & Stonington Street Railway, Groton, Conn., has completed negotiations with the state highway department of Connecticut for the purchase of 1,800 ft. of trackage over the Thames River at New London, Conn., including the approaches on both sides of the bridge. The highway department when the bridge was built two years ago, laid the tracks over the bridge since at that time none of the street railways were in a financial condition to pay the expense of construction. State Highway Commissioner Bennett has agreed to sell the trackage for the sum which it originally cost the state, $3,800. The full amount will be paid the State before the trolleys begin to operate over the bridge.

Power Houses, Shops and Buildings

Savannah Electric & Power Company, Savannah, Ga., has recently completed repairs on the two steel stacks of the Indian Street power plant.

Springfield (Mass.) Street Railway has offered to pay $3,000 toward the cost of building a cement bridge at Frog Hole, in Westfield, Mass., the bridge being on the company's route between the two cities. The bridge is to be 30 ft. wide and will cost $30,000.

Trade Notes

Globe Railway Equipment Company, St. Louis, Mo., has been incorporated with a capital stock of 20,000 shares of no par value to manufacture and deal in railway machinery, equipment, devices and all articles pertaining to railway lines.

G. P. Atkinson, who has been associated with the Weston Electrical Instrument Company for the past six years, will also represent the Ward Leonard Electric Company in the Atlanta district. Mr. Atkinson has established an office in the Atlanta Trust Building, Atlanta, Ga.

Rail Welding & Building Company, Cleveland, Ohio, announces the addition to its staff as sales engineer of L. R. Berkeley, E. E. of Cornell University, who has been associated for a number of years with the sales and engineering departments of the National Carbon Company. Mr. Berkeley will cover the territory of western Pennsylvania, Ohio, Indiana, Kentucky, and Michigan. He replaces A. C. Sullivan, resigned.

L. D. Miller, Stamford, Conn., formerly Eastern representative International Motor Company, has made public plans which he is prepared to carry out for the leasing of buses to electric railway companies. Under this plan, the lessor supplies all service, including driver, gasoline, oil, repairs and public liability insurance for a limited period at a price determined by the mileage operated. It is expected, however, that this price will be approximately 30 cents per bus-mile.

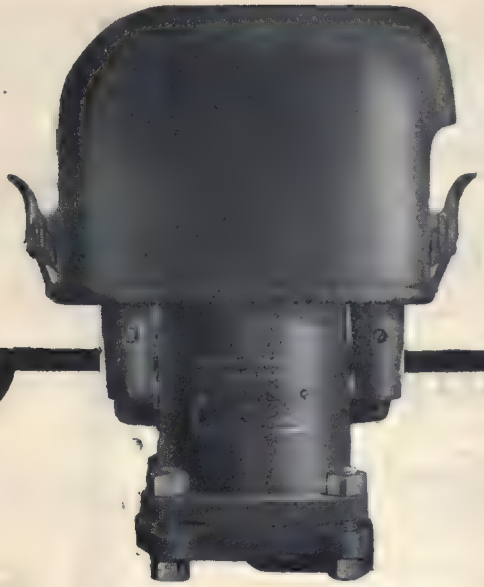
New Advertising Literature

R. D. Nuttall Company, Pittsburgh, Pa., has issued Bulletin No. 32 giving thirteen important points of the Nuttall Form 13-E Trolley Base.

Erie Electrical Equipment Company, Johnstown, Pa., has issued a new catalog of fittings and other construction devices. A large number of special fittings have been developed by this company which are of particular value for construction of outdoor substations and automatic substations.

Brown, Boveri & Company, Baden, Switzerland, have issued a well-illustrated 100-page bulletin giving descriptions of the manufacturing plants and of the products of the company. A large section is devoted to electric traction on main line and interurban railways, in the development of which this company has played an important part.

Crouse-Hinds Company, Syracuse, N. Y., has issued a complete and attractively bound book on Condulets. The Catalog known as No. 2000 containing 713 pages has been carefully compiled to show in a comprehensive manner the various devices manufactured by the company for use in conduit installations and known under the trade name "condulets." The catalog is replete with illustrations.



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Type OB Governor for Air Brake Equipment

The dependability of this governor has led to its adoption by railways and other users of air compressors.

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MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN. U.S.A.

3
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Simple Parts

and only three parts, make up White's Porcelain Trolley Hanger. This is a big advantage in shortening the time and labor of installation and in lengthening the service life of the hanger.

WHITE'S
Porcelain
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consists of the sherardized malleable iron yoke, the heavy glazed porcelain insulator and the "stud"—a standard bolt, sherardized or furnished in bronze.

The illustration will convince you of the ease of installation and alignment. You can see that this hanger will give service, too—there is no possibility of the insulation "breaking down" or cracking.

We will send you a sample and it will tell its own story to you. Let us give you quotations on complete hangers or parts which we have in stock for

Immediate Delivery

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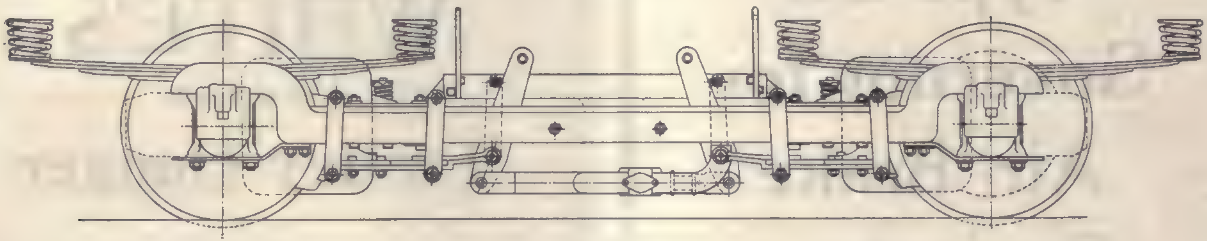
Chillingworth

One Piece Seamless Drawn Steel Gear Cases

Vibration and bumps are all in the day's work for Chillingworth Gear Cases. No rivets to loosen, no malleable iron to crack. They are

"Built for Service."

Chillingworth Mfg. Co., Jersey City, N. J.



Gould Automatic Slack Adjuster

Specified for One-Man Safety Cars

The leading electric railway companies of this country request Gould Slack Adjusters on their cars. They know that their automatic operation can be depended upon to always keep the brake rigging taut. They also know that the cost of Gould Slack Adjusters is soon saved by reduced wear on brake shoes and lower air consumption for braking, less labor cost and fewer accidents.

Write for full particulars in connection with our types A, B & C adjusters made for every style of car truck.

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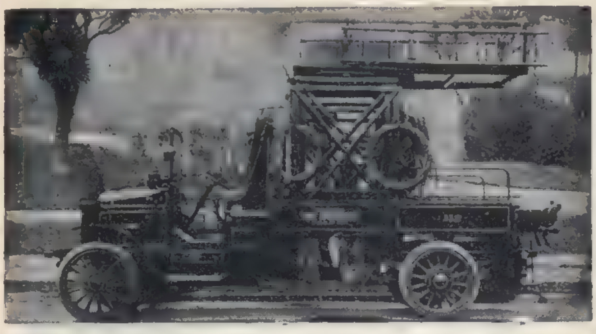
30 East 42nd St., New York City **Works: Depew, N. Y.** **The Rookery, Chicago, Ill.**



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This 3-Section

TRENTON TOWER

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.
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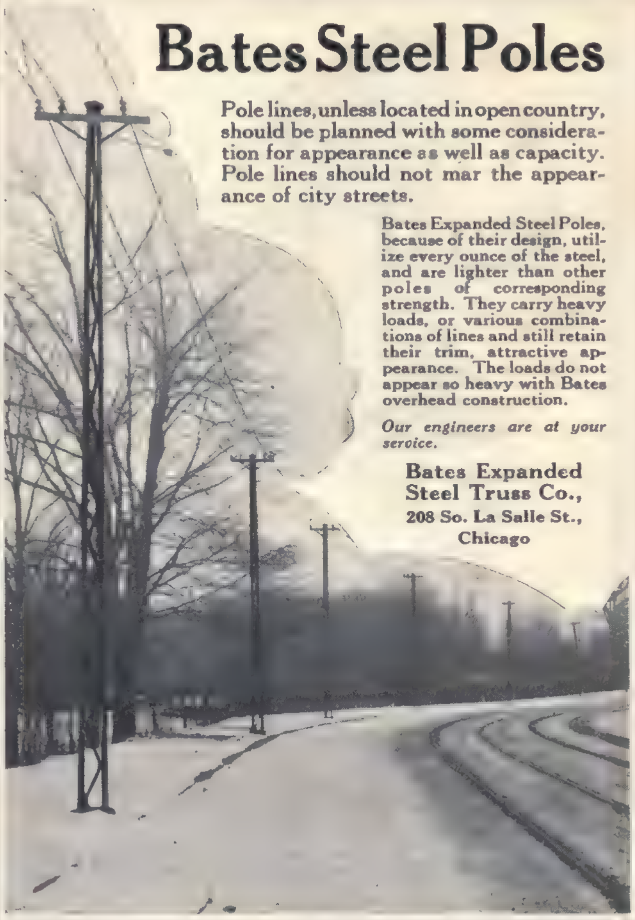
Bates Steel Poles



Pole lines, unless located in open country, should be planned with some consideration for appearance as well as capacity. Pole lines should not mar the appearance of city streets.

Bates Expanded Steel Poles, because of their design, utilize every ounce of the steel, and are lighter than other poles of corresponding strength. They carry heavy loads, or various combinations of lines and still retain their trim, attractive appearance. The loads do not appear so heavy with Bates overhead construction.

Our engineers are at your service.

Bates Expanded Steel Truss Co.,
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BARE COPPER WIRE AND CABLE

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PAPER INSULATED UNDERGROUND CABLE

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AMERICAN ELECTRICAL WORKS AMELECTRIC Wires and Cables PHILLIPSDALE, R.I.

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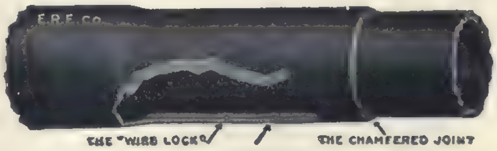
Galvanized Iron and Steel Wire and Strand

Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way.

ELRECO TUBULAR POLES



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Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**

Catalog complete with engineering data sent on request.

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ANACONDA
from mine to consumer

THE AMERICAN BRASS COMPANY
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NASHVILLE TIE COMPANY

Cross Ties: White Oak, Chestnut, and Treated Ties. Oak Switch Ties.

Prompt shipment from our own stocks.

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Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

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Superior quality, economical prices
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CROWN
UNITED STATES
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Send for new
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Drip Points for Added Efficienc

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000, Wet 31,400, Line 10,000.

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Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

"RIMCO" Insulated Screw Driver

The only SAFE Screw Driver for linemen and all high tension work

7½", 8½", 10½"

Tested and passed at 5,000 volts by Electrical Testing Laboratories of N. Y. City.

Semi-soft rubber insulation bonded to metal by Elchemco process. Insulation cannot crack or work loose.

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Rubber Insulated Metals Corporation
50 Church Street, New York City, U. S. A.
Distributed by The Electric Service Supplies Co., and other distributors
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Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.

Transmission Line and Special Crossing Structures, Catenary Bridges

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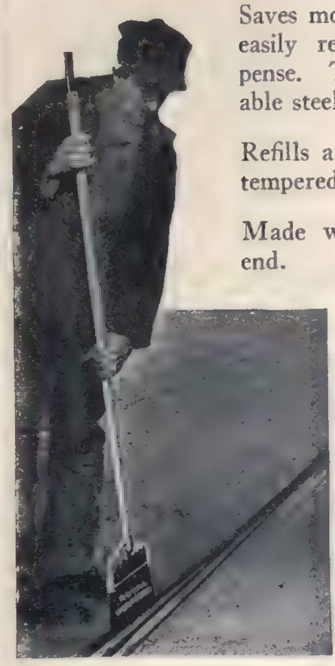

Detachable Steel Brooms

The Royal Worcester

Saves more than 200% as it is easily re-filled at trifling expense. This is the only detachable steel broom on the market.

Refills are made from the best tempered round steel wire.

Made with or without chisel end.

Steel heads are treated with Anti-Rust process.

Write for full details and quotations. It will pay you.

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This Toncan Metal Corrugated Culvert sold by us and installed under the Toledo & Indiana Railway in 1908, is still in good condition. Toncan Culverts endure. They are anti-corrosive! Write for prices.

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Established 1858

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Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

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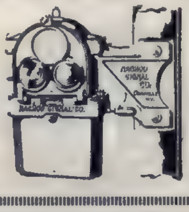

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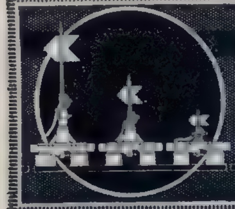
U. S. Electric Contact Signals
for
Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work

United States Electric Signal Co.
West Newton, Mass.



RAMAPO
Automatic Return Switch Stands for Passing Sidings
Automatic Safety Switch Stands
Manganese Construction · Tee Rail Special Work
RAMAPO IRON WORKS
HILLBURN · NEW YORK
Plants at Hillburn N.Y. and Niagara Falls N.Y. New York Office 30 Church St.

FLOOD CITY
Rail Bonds and Trolley Line Specialties
Flood City Mfg. Co., Johnstown, Pa.

THE INDIANAPOLIS SWITCH & FROG CO., SPRINGFIELD, OHIO

Indianapolis Economy Products That Make Dollars "Grow"

Indianapolis Solid Manganese:
Frogs, Crossings, Mates and Tongue-switches. Super-quality material. Par-excellent designs. Gives many lives to one, of ordinary construction, and when worn down, CAN BE RESTORED by INDIANAPOLIS WELDING.

Indianapolis Electric Welder:
Efficient, Rapid, ECONOMICAL, Durable. Price, $2.00 (per day for three hundred days) thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

Indianapolis Welding Steel:
Fluxated heat treated Metal Electrodes, insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untreated.

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Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and COUNTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

Indianapolis Welding Supplies:
CABLES, HELMETS, LENSES, CARBONS.

Turntables:
Ball-bearing, for ash-pits, storage yards, etc.

Indianapolis "Economy" Products
are Pre-eminently "Money Savers," YES—"Money Makers" for Electric Railways.

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

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SPECIAL TRACKWORK

Of the well-known WHARTON Superior Designs *and* Constructions

Steel Castings Converter and Electric
Forgings Drop Hammer and Press
Gas Cylinders Seamless Steel

Wm. Wharton Jr. & Co. Inc., Easton, Pa.
(Subsidiary of Taylor-Wharton Iron & Steel Co., High Bridge, N. J.)

ORIGINATORS OF
MANGANESE STEEL TRACKWORK

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio

SUPER-SEASONED FIBRE

Peerless Insulation Paper has 25 to 50 per cent higher electrical resistance.

S-S TRADE MARK

Hornflex Insulation Paper has no grain. Folds without cracking.

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THE CUTTER ELECTRICAL AND MANUFACTURING CO. PHILADELPHIA
CIRCUIT I-T-E BREAKERS

I. T. E.
Circuit Breakers

for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

FOSTER SUPERHEATERS

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

POWER SPECIALTY COMPANY, 111 BROADWAY, NEW YORK
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From Every Angle

That patented Loop Guide keeps the hand chain of a Ford Tribloc from gagging or over-riding its wheel—no matter from what angle or at what speed the Tribloc is operated.

And from whatever angle you consider the Tribloc —*speed, safety, convenience, efficiency*—it is the most satisfactory hand hoist made.

Capacities to 40 Tons

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FORD CHAIN BLOCK CO.
2nd & DIAMOND STREETS PHILADELPHIA, PA.

A REAL RAIL BOND TESTER

The Vawter New Type Direct Reading Instrument Is in a Class by Itself

Send for Bulletin if you have Rail Bonds

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The J. W. Murphy Co., 108 S. LaSalle St., Chicago, Ill.
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THE WORLD'S STANDARD

"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.
Sales Representatives in the Principal Cities

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EST. 1865 AIMCO INC. 1916
"American" Insulating Machinery Company
REG. U.S. PAT. OFF.
Philadelphia Pennsylvania U.S.A.

"American" Electric Railway Automatic Signals.
RECLAIMING MACHINES } for recovering
INSULATING MACHINES } insulated wire

WILLIAMS' "VULCAN"
FORGED-CUTTER TOOL HOLDERS

For continuous heavy cuts at high speed on lathe, planer, shaper, etc. Change the cutter, *not* the tool, and get all the advantages of the solid bar without its expense. Literature?

J. H. WILLIAMS & CO.
"The Drop-Forging People"

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CHICAGO
1057 W. 120th St.

TULC
A LUBRICANT

We make a specialty of

ELECTIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment.

The Universal Lubricating Co.
Cleveland, Ohio

PERFECT
MICANITE
INSULATOR
Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

Catalogs will gladly be furnished

MICA INSULATOR COMPANY
Sole Manufacturers of Micanite
Established 1893

68 Church St., New York **542 So. Dearborn St., Chicago**
Works: Schenectady, N. Y.

8-F

Car Seat and
Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Islands in the Indian Ocean. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

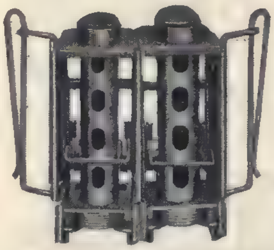
High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY
Factory: Wakefield, Mass.

SALES OFFICES:
Heywood-Wakefield Co., 516 West 34th St., New York.
Heywood-Wakefield Co., 1415 Michigan Ave., Chicago.
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
Railway and Power Engineering Corp., Toronto and Montreal.
G. F. Cotter Supply Co., Houston, Texas.

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels, to suit his personal requirements and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

International Registers

Type R-10

Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

STERLING VARNISH

Manufactured by electrical engineers who will understand your insulating problems and render intelligent service. Noted for uniformity and quality. It will pay you to get in touch with

The Sterling Varnish Co., Pittsburgh, Penna.

METER THE ENERGY
that's what you want to save

Then double the saving by inspecting cars on a kilowatt-hour basis instead of mileage or time-basis. Ask for data.

ECONOMY ELECTRIC DEVICES COMPANY
L. E. Gould, 37 W. Van Buren St., Chicago
GENERAL AGENT: Lind Aluminum Field Coils.
DISTRICT AGENTS: Peter Smith Heaters, Woods Lock Till Fare Boxes, Bemis Truck Specialties, Miller Trolley Shoes.

Perry Hartman
Side Bearings and Center Plates

Reduce Your Power Bill and
Make Your Cars Easy Riding

Flange wear is greatly reduced, rail wear decreased and derailments prevented. "Nosing" of truck is stopped. No lubrication. Car maintenance reduced. 200,000 in use.

Write for details.

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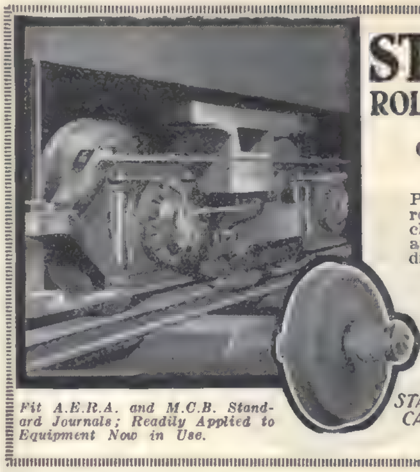
Peoples Gas Bldg., Chicago
Electric Railway Sales Distributors: Holden & White, Inc., Chicago. —National Ry. Appliance Co., New York—Ry. & Power Engrg. Corp., Toronto, Can.



Fit A.E.R.A. and M.C.B. Standard Journals; Readily Applied to Equipment Now in Use.

STAFFORD
ROLLER BEARINGS

Cut Power Requirements in Half

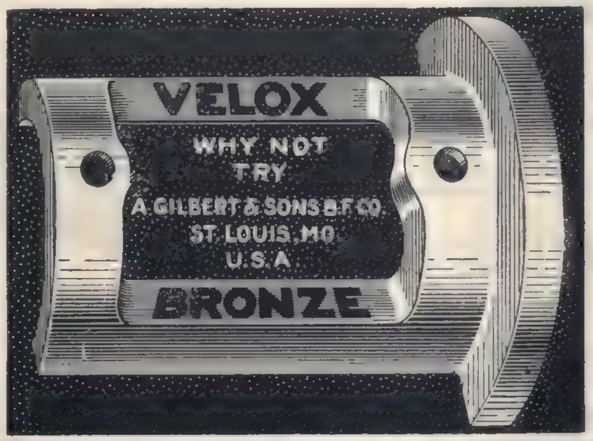
Prevent hot boxes and resulting journal troubles; check end thrust and do away with all lubrication difficulties BECAUSE—

They Eliminate Journal Friction.

Guaranteed Two Years.

Ask for literature

STAFFORD ROLLER BEARING CAR TRUCK CORPORATION
LAWTON. MICH U.S.A



The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be mislead by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

PS HEATERS

Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. **Write for details.**

The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

N-L

Indicating Signals
Mechanical Sanders
Ventilators, Smokestacks
Pneumatic Sanders
Selector Switches, Lanterns, etc.

THE NICHOLS-LINTERN CO.
8404 Lorain Ave., Cleveland, Ohio

Tickets and Cash Fares.
THE CLEVELAND
accommodates both
The Cleveland Fare Box Co.
CLEVELAND **OHIO**
Canadian Cleveland Fare Box Co., Ltd.,
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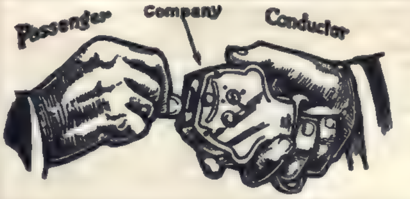

Direct
Automatic
Registration
By the
Passengers
Rooke Automatic
Register Co.
Providence, R. I.

Gets Every Fare
PEREY TURNSTILES
or PASSIMETERS
Use them in your Prepayment Areas and Street Cars

Perey Manufacturing Co., Inc.
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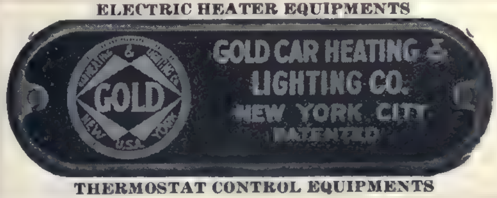
ELECTRIC HEATER EQUIPMENTS



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Literature on Request

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FENDERS **LIFE GUARDS**
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General Sales Agents

75% of the electric railways
use
B-V Punches
Send for Catalog
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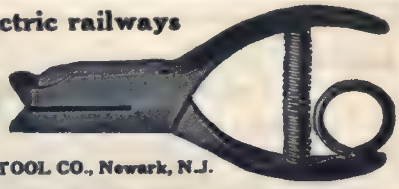

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—The right retriever!

THERE is a special type of EARLL Trolley Catcher or Retriever for every type of service. Our business is making retrievers and catchers—nothing else. We have specialized in this particular field for your benefit. Consult us.

C. J. Earll York, Pa.

Brake Shoes

A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR

D-67 for Narrow Treads
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American Brake Shoe and Foundry Co.
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Tool Steel Gears and Pinions
Anderson Slack Adjusters
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Dunham Hopper Door Device
Feasible Drop Brake Staffs
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Peerless and Perry Side Bearings
Drew Line Material and Railway Specialties
Hartman Centering Center Plates
Economy Power Saving Meters
H & W Electric Heaters
Garland Ventilators
Pitt Sanders
National Safety Car Equipment Co.'s One-Man Safety Cars
Central Equipment Company's Hand Holds
Tnemco Paint & Oil Company's Cement Paint

Ajax Perfecto Bronze Check Plates

Made from our Perfecto Bronze — the strongest and toughest metal on the market; will bend before it will break. Withstands shocks therefore, and outlasts all other check plates several times.

Specify Ajax Perfecto Bronze on your next requisition.

The Ajax Metal Company
Established 1880
Main Office and Works: **Philadelphia, Pa.**

STEEL AND STEEL PRODUCTS

MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY
General Sales Office: WIDENER BUILDING, PHILADELPHIA, PA.
DISTRICT SALES OFFICES:
Atlanta Boston Chicago Cincinnati Cleveland Detroit New York Philadelphia Pittsburgh San Francisco Salt Lake City Seattle St. Louis Washington, D. C.

Consolidated Steel Corporation, 25 Broadway, New York, is the sole exporter of our commercial products.

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

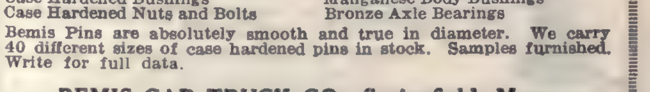
BEMIS CAR TRUCK CO., Springfield, Mass.

Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.

AMERICAN RATTAN & REED MFG. CO.
Brooklyn, N. Y.

AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

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UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

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INFORMATION:

Box Numbers in care of any of our offices count 5 words additional in undisplayed ads.

Discount of 10%, if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 14 inches	4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS WANTED

GENERAL manager with successful record, wants job with a company having difficulty in making expenses. Experienced in freight development and successful with labor. PW-462, Elec. Ry. Journal, Leader-News Bldg., Cleveland, O.

MANAGER or engineer. Graduate electrical engineer, 43, engineering, appraisals, rates with railway, power and lighting systems. Design, construction, operation of power and substations, distribution, transmission, power and lighting. Engineering on cars, equipment, tracks, transportation, buildings and shops. Statistical cost, economic and organization studies. PW-442, Elec. Ry. Journal.

MAN with five years' experience in travelling capacity installing electrically welded rail joints and with experience in electric shop welding, desires permanent connection with electric railroad anywhere in United States or Canada. PW-456, Elec. Ry. Journal, Leader-News Bldg., Cleveland, O.

PRACTICAL master mechanic, 41 years old, married, desires change, 22 years' experience in all mechanical departments. Can rebuild and maintain equipment at minimum cost. Reference, past and present employers. PW-454, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

SUPERINTENDENT of transportation, with a proven successful record of 18 years on large city, suburban and interurban properties, at present employed, desires a change and will consider any property that needs a capable, efficient official who possesses a full knowledge of all details of transportation and is capable of getting results. Very successful in public relations and dealing with labor. Best of references from leading men in electric railway field. Personal reasons for desiring change. PW-455, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

YOUNG man with three years' experience in power house and car-barn, desires position; a go getter. PW-458, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

FOR SALE

2 SNOW SWEEPERS

On McGuire Truck, 50-hp. motors, double end K-35 G. E. Control. Very low price. Immediate delivery.

ELECTRIC EQUIPMENT COMPANY,
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

SNOW PLOW

1—Set New Russell Ends with attachments.

TRANSIT EQUIPMENT COMPANY,
Cars—Motors
501 Fifth Avenue, New York.

"SEARCHLIGHT"

IS

Opportunity Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want

"Think SEARCHLIGHT First"

0167

Let Us Manufacture and Sell Your Products in Canada

97% Of The Canadian Street Railways Use Our Products

Prominent Canadian manufacturer is in a position to take over in Canada the manufacture and sale of street railway supplies and desires to negotiate with American manufacturers with that purpose in view.

Royalty or Commission Basis

Company is well established, and has good connections throughout the Dominion, being in touch with all Canadian street railway officials.

President will attend the A.E.R.A. Convention at Chicago and will be glad to personally discuss arrangements at that time. Interested manufacturers can communicate with him by addressing.

B. O. 461, Electric Railway Journal, Leader-News Building, Cleveland, O.

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

0098

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers & Aftercoolers
Ingersoll-Rand Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Armature Coil Equip. Co.
Elec. Service Supplies Co.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
Carnegie Steel Co.
Midvale Steel & Ord. Co.
Standard Steel Works Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Westinghouse E. & M. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Elec. Service Sup. Co.
Int. Register Co., The

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
More-Jones Br. & Metal Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Burry Railway Supply Co.
Stucki Co., A.

Bearings, Roller
Stafford Roller Bearing Car Truck Corp.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
Cambria Steel Co.
Midvale Steel & Ord. Co.

Bond Testers
Amer. Steel & Wire Co.
Elec. Service Sup. Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Sup. Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Sup. Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.

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McGraw-Hill Book Co., Inc.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Exp. Steel Tr. Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Safety Car Devices Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Worcester Brush & Scraper Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Brushes, Wire, Pneumatic
Ingersoll-Rand Co.

Brush Holders
Anderson Mfg. Co., A. & J .M.
Columbia M. W. & M. I. Co.

Buses, Motor
Brill Co., The J. G.
Duplex Truck Corp.
Mitten-Traylor, Incorporated

Bushings
Nat'l Fibre & Insulation Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables. (See Wires and Cables)

Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
Wetsinghouse E. & M. Co.

Cars
Cambria Steel Co.
Midvale Steel & Ord. Co.

Cars, Dump
Differential Steel Car Co.

Car Lighting Fixtures
Elec. Service Sup. Co.

Cars, Passinger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ord. Co.
National Ry. Appliance Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
More-Jones Br. & Metal Co.

Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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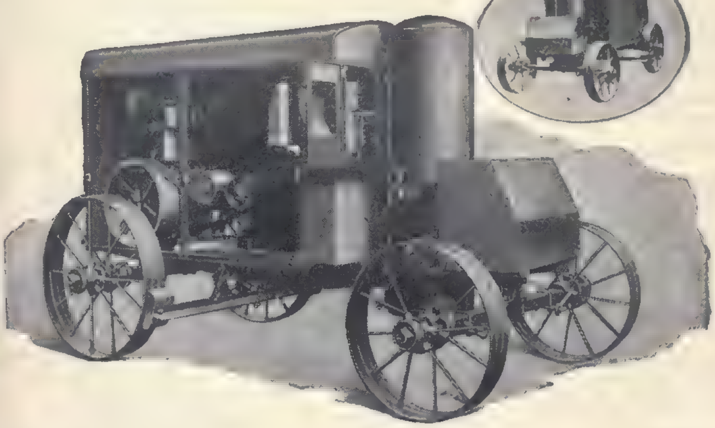

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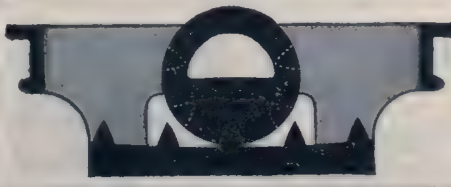

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Bayonet Trolley Base with Detachable Pole Clamp

is the only trolley clamp made on which the trolley pole can be changed in 30 seconds and the wheel be in perfect alignment with the wire. No tools are required to do this job. It prevents schedules being delayed. A uniform wire pressure at all angles of the pole is obtained, thus saving on your overhead, wheel and wire.

Bayonet Sleet Cutters

have no superiors when it comes to cutting ice from the wire. Both rigid and semi-rotary types furnished.

Bayonet Trolley Harp Co.
Springfield, Ohio

Trolley Bases
Anderson Mfg. Co., A. J. & J. M.
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.
Trolley Supply Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & Mfg Co.

Trolley Material
Ohio Brass Co.
Elec. Service Sup. Co.

Trolleys and Trolley Systems
Ford Chain Block Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co
Roebling's Sons Co., J. A

Trucks, Car
Bemis Car Truck Co
Brill Co., The J. G
McGuire-Cummings Mfg. Co.

Tubing Yellow & Black Flexible Varnish
Irvington Varnish & Ins. Co.

Turbines, Steam
Allis-Chalmers Mfg Co
General Electric Co
Westinghouse E & M Co

Turntables
Indianapolis Switch & Frog Co.

Turnstiles
Damon-Chapman Co.
Elec. Service Sup. Co.
Perey Mfg. Co., Inc

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Amer. Rattan & Reed Mfg Co.

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Ohio Brass Co.
Westinghouse Tr. Br. Co.

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Irvington Varnish & Ins. Co.

Varnished Silk
Irvington Varnish & Ins. Co.

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Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.

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Ohio Brass Co.
Rail Welding & Bonding Co.

Welders, Portable Electric
Electric Railway Improvement Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Welding Processes and Apparatus
Electric Railway Improvement Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Metal & Thermet Corp.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse E & M. Co.

Welding Steel
Indianapolis Switch & Frog Co.

Wheels, Car Steel & Steel Tire
Standard Steel Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
Bemis Car Truck Co.

Wheels, Trolley
Anderson Mfg. Co., A. J. & J. M.
Bayonet Trolley Harp Co.
Columbia M W. & M. I Co
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Gilbert & Sons, A.
Electric Ry. Equip. Co.
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More-Jones Br. & Metal Co.
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General Electric Co.
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Midvale Steel & Ord. Co.

Wire Rope
Amer. Steel & Wire Co.
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Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
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Westinghouse Tr. Br Co.

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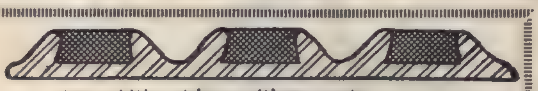

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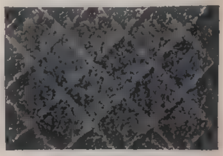

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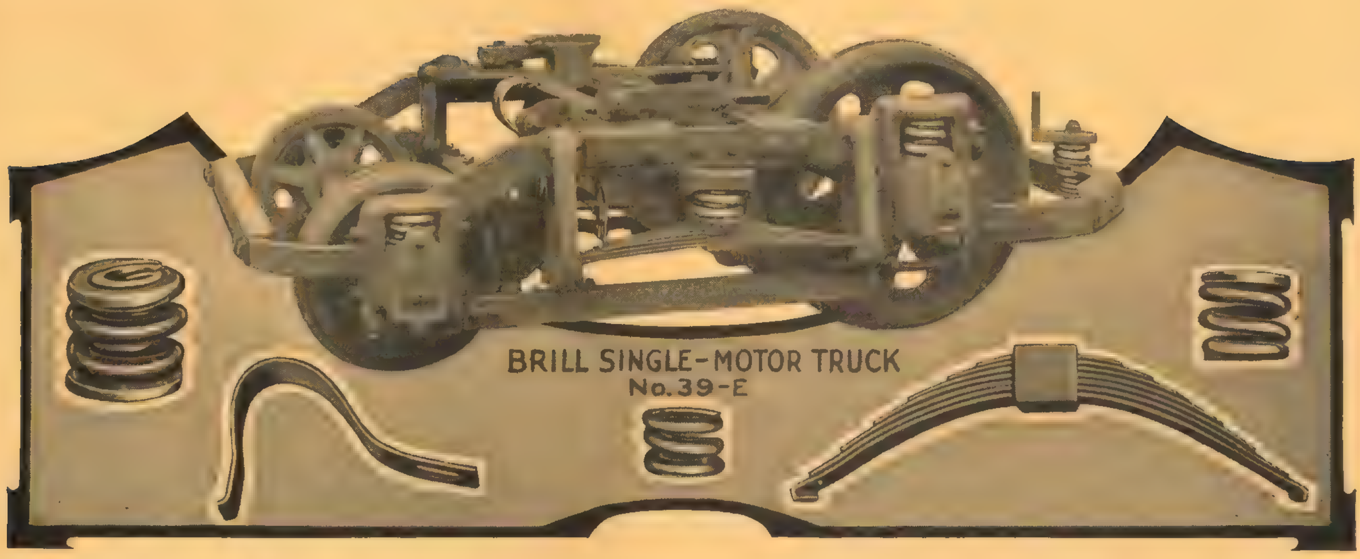

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Correctly manufactured springs are vitally important to the riding action of your cars.

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Bushings, Case-hardened
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From city after city
the reply comes in—

"the answer to 'why' *is* 'WEAR'"

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East, West, North, South, wherever Phono-Electric is used. For a quarter of a century experienced operators have reported "it outwears hard-drawn copper two to three times." It is tougher, stands more abuse and does so consistently.

Reports like these, based on facts, can come only after years of service experience. Phono-Electric has had the service experience and we can therefore quote facts.

Bridgeport Brass Company
Bridgeport Connecticut

Better Line Material Helps Sell a Better Service

Permanency of overhead construction is vital to the selling of quality service. High rates of acceleration and shock loads must be reckoned with if continuity of operation is to be assured.

Westinghouse line material keeps your overhead in good condition. It is designed for the severest service and can be relied upon to stand the strain where traffic is heaviest. Wherever difficult line problems are encountered — such as reverse curves or long stretches of accurately aligned overhead — Westinghouse-Cleveland splicers, Fittite suspensions and frogs give maximum wear and reliability.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
East Pittsburgh, Pa.

Westinghouse

The Table of Contents for this issue will be found on page nineteen

Prosperity

The Industry

The Railway Industry's history is familiar to all, but the experiences and resultant developments during the past decade, combined with the signs of the times, establish a new faith which is accepted by important authorities and leaders of industry as the most encouraging indication ever presented to the Industry as a whole. Public opinion, which has changed from hostility to an attitude of growing friendliness and cooperation in many places, and the new spirit of determination prevalent among railway men, form a reinforced foundation of confidence.

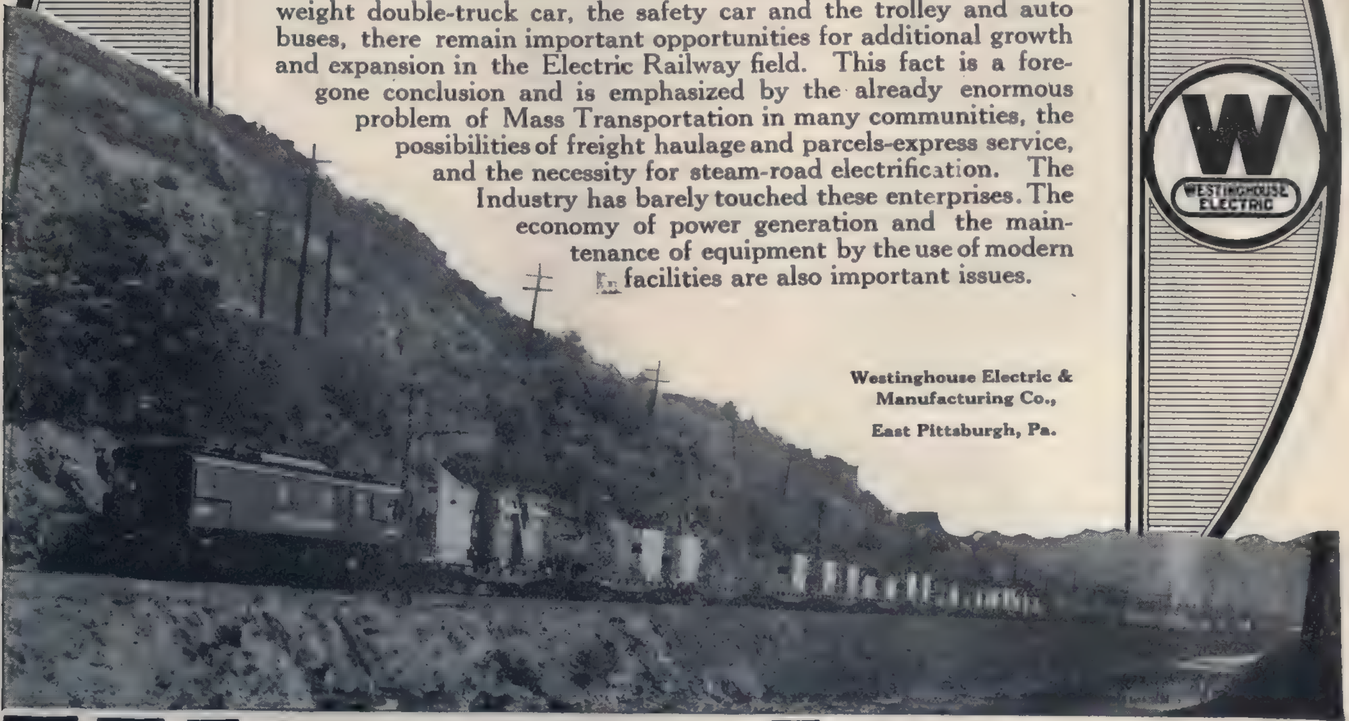
These assurances, and the fact that the industry's importance has grown to be one of national concern, provide the long delayed encouragement necessary to stimulate that essential self-interest required for the advancement of all worth-while undertakings.

Today, the Industry stands emerged from the conflict, materially strengthened on the threshold of a period of promise and prosperity. It has been strengthened in every branch of activity by the development of ability and ambition unequaled in the past.

Recent Accomplishments and Future Prospects

Although rapid strides have been made in the development and correlation of modern transportation devices, such as the light-weight double-truck car, the safety car and the trolley and auto buses, there remain important opportunities for additional growth and expansion in the Electric Railway field. This fact is a foregone conclusion and is emphasized by the already enormous problem of Mass Transportation in many communities, the possibilities of freight haulage and parcels-express service, and the necessity for steam-road electrification. The Industry has barely touched these enterprises. The economy of power generation and the maintenance of equipment by the use of modern facilities are also important issues.

Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.



Westinghouse

Development

The progress of the times is further evidenced by the extensive activities of other countries introducing a world-wide expansion of the Electric Railway industry. The most recent evidence of this is the initial shipment to Chile by the Westinghouse Company of two complete trains of electrical apparatus, each train consisting of more than thirty loaded cars of equipment for railroad electrification in that country.

The Westinghouse Company is prepared, with its resources and vast engineering experiences, to support the industry's every effort toward progress and advancement.

Development

The remarkable success in the development of this country's transportation is due primarily to American progressiveness in the use of advanced operating methods and the rapid adoption of superior devices.

Railway Motors

Westinghouse Engineers, fully appreciating this tradition, are constantly searching for, and applying to the Westinghouse line of standard railway motors, every substantial improvement that modern operating requirements develop.

This spirit of cooperation is represented in each one of the full line from the 508-A, 25-hp. to the 577, 200-hp. motors.

All conform to the standards established by the American Electric Railway Association, and embody many valuable suggestions made by prominent railway operating men.

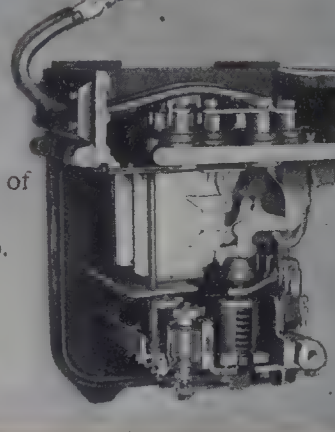
HL Control

HL control, over twelve years ago, predicted to become "The Standard of the Country," has exceeded by far the expectations of those instrumental in its development.

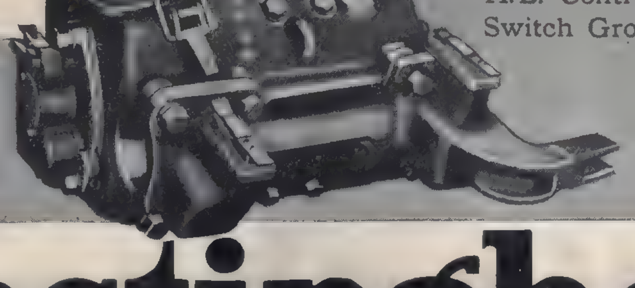
Its adoption by the majority of roads for multiple-unit, heavy-traffic service, such as for locomotives, subways, elevated and interurban lines, has led to the perfection of all parts and the addition of many refinements so that today HL control stands unexcelled in universal application.

This enviable popularity of HL control is the outgrowth of modern transportation's great demand for a simple and durable mechanism to perform reliably a constantly increasing duty.

Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.



Cross-section of H.L. Control Switch Group.



No. 510-A, 25 hp. Railway Motor.

Westinghouse

Progress

Mass Transportation

Wide awake operating men are constantly contributing to the progress toward perfection of electric transportation by the power of concentrated study and keen foresight in meeting their numerous important problems. Chief among these is mass transportation.

The success of all undertakings depends upon the choice of equipment and its well-planned operation. Weight, economy, efficient apparatus, quick and reliable service are all that the public needs and wishes. All these characteristics are inherent in the Safety Car and Light-weight, Double-truck Car, both of which have been adopted by a large number of progressive roads.

Safety Cars

With many of the 350 or more users of the safety car adding larger numbers annually, its position in the transportation field is unquestioned. Its great success is due to the effective combination of valuable ideas and the selection of the correct equipment. Westinghouse motors figured prominently in the creation and establishment of this modern car. Specify the Westinghouse 508, 25-hp. motor for safety cars.

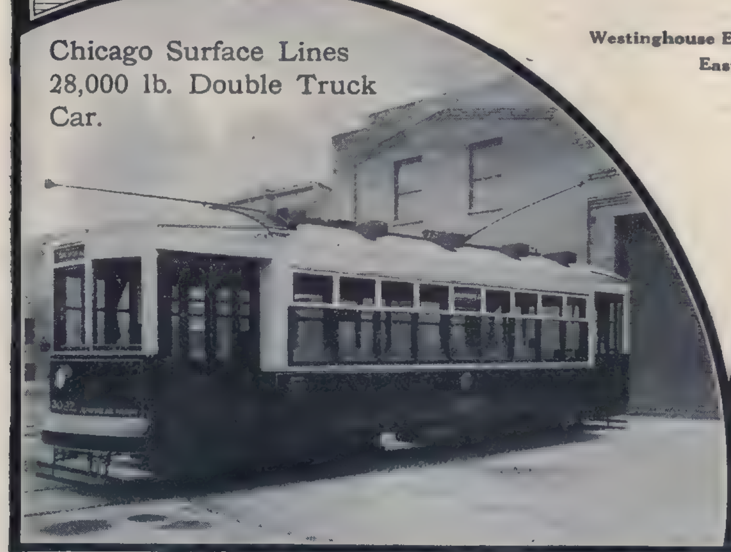
The Light-Weight, Double-Truck Car

Substantial encouragement was engendered when the industry's trend of thought turned toward the Light-weight, Double-truck car as the solution of Mass Transportation. Besides the item of lower first cost, operating economy and the possibility of one-man, two-man operation and train operation during peak periods, this type of car offers new opportunities for many roads formerly hampered by cumbersome and inefficient rolling stock.

The Westinghouse Company, one of the chief advocates of this movement, has paved the way to secure maximum economy with light-weight cars by the addition of the No. 510, 35-hp. motor to its standard line. There is now a standard Westinghouse motor for every railway requirement.

For larger capacity, trailer hauling in cities enjoying level topography, Westinghouse standard No. 532, 50-hp. motors meet this requirement.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



Chicago Surface Lines 28,000 lb. Double Truck Car.

Standard Safety Car.

Westinghouse

Expansion

Freight Haulage

The ever-increasing industrial development of this country requires that every railroad should serve each community to the fullest measure. Passenger, freight and express electric rail lines, by rendering all-around service, become a definite part of community life and invariably strengthen their position with the public. Prosperity and progress are thus assured.

That Freight-Haulage Service, whether it be parcels-express or heavy freight, has definite possibilities, isexemplified by a number of progressive roads who have adopted it. Inquire or investigate and it will be found that Freight Haulage is profitable and desirable business and aids largely in the relief of traffic congestion wherever used.

Now is the time for every electric railway to carefully analyze this possibility for expansion.

Locomotives

Baldwin-Westinghouse standard locomotives are built for all classes of electric railway service, low speed and high speed, in the following standard sizes.

Class A—25 to 30 ton.
Class B—45 to 50 ton.
Class C—60 to 65 ton.

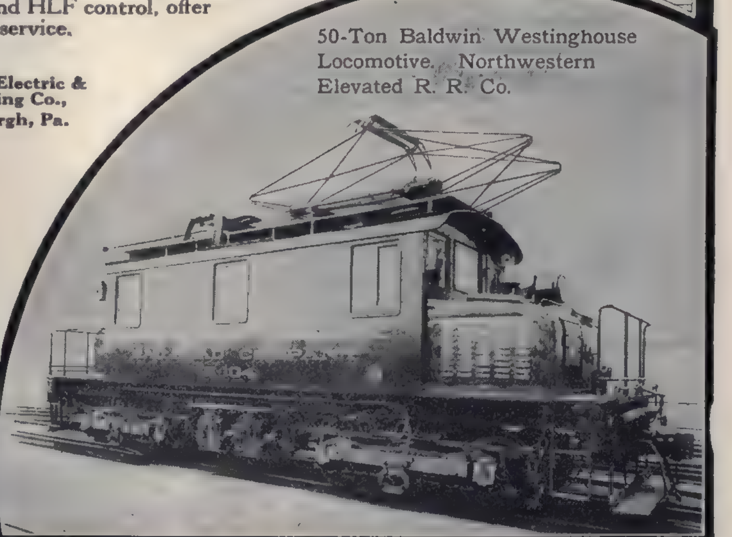
Their reputation is established by the fact that those who have them in operation always specify duplicates when purchasing additional locomotives.

Motor Freight Cars

Freight cars for trailer haulage and package express have been used to build up valuable revenue service on many roads. The degree of success of this class of business, however, depends upon the selection of equipment, just the same as that careful consideration given motors and control for passenger cars and locomotives. Modern Westinghouse slow-speed or high-speed motors, as conditions may require, and HLF control, offer any advantages in this class of service.

Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.

35-50 ton Express Car E. St. Louis, Columbia & Waterloo Ry.



50-Ton Baldwin Westinghouse Locomotive. Northwestern Elevated R. R. Co.

Westinghouse

Efficiency

MEMBER
AMERICAN ELECTRIC RAILWAY ASSOCIATION
AERA
1922

Remove the alternating current generator from this land and we would turn back the hand of time more than thirty years.

Industry would again find itself in the doldrums—laboring under the handicap of the transmission limitations of direct current.

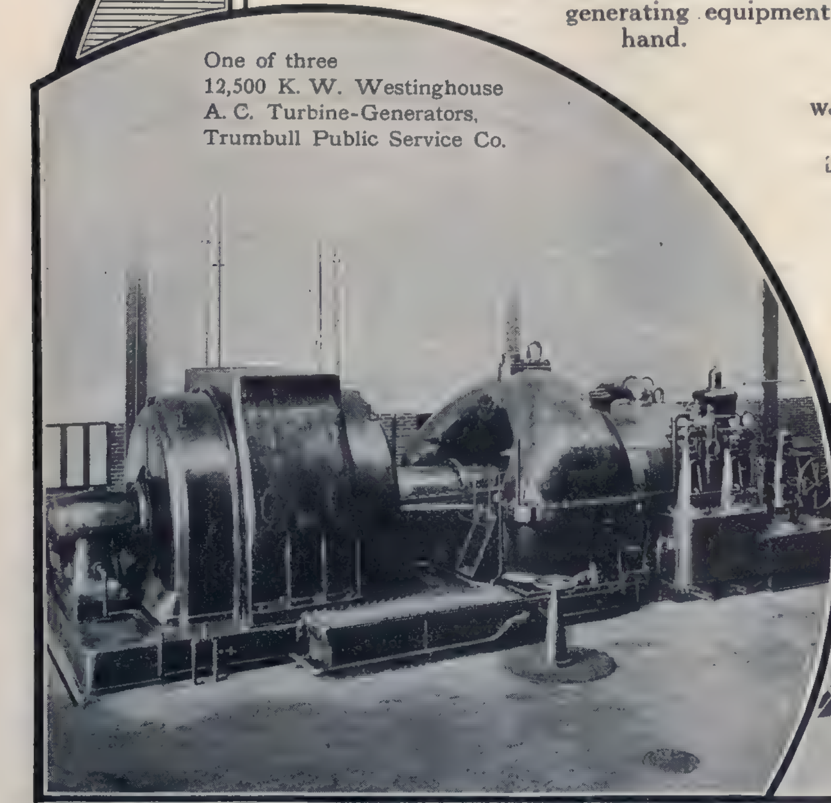
The street railway and the interurban train are the direct outgrowth of the development of the alternating-current system. In fact, the introduction of this system in this country by George Westinghouse thirty years ago opened up a multiplicity of possibilities that have brought about the marvelous industrial development of the present day.

Improvement in alternating-current generating equipment itself, has been marvelous. The 30,000, 50,000 or 70,000 kw. alternating-current turbine-generator is not uncommon in the central power stations which serve, in large part, the electric railroads and industrial plants of this country.

The success of Westinghouse large turbine-generating units in the capacities above mentioned is particularly noteworthy.

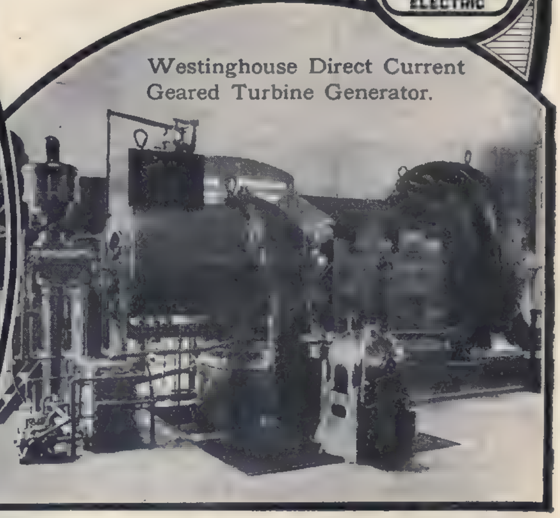
There could be little industrial progress without adequate and suitable power generating and distributing facilities. Industrial expansion and the growth of power-generating equipment will go on, hand-in-hand.

Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.



One of three
12,500 K. W. Westinghouse
A. C. Turbine-Generators,
Trumbull Public Service Co.

W
WESTINGHOUSE ELECTRIC



Westinghouse Direct Current
Geared Turbine Generator.

Westinghouse

Economy

Electric Arc Welding

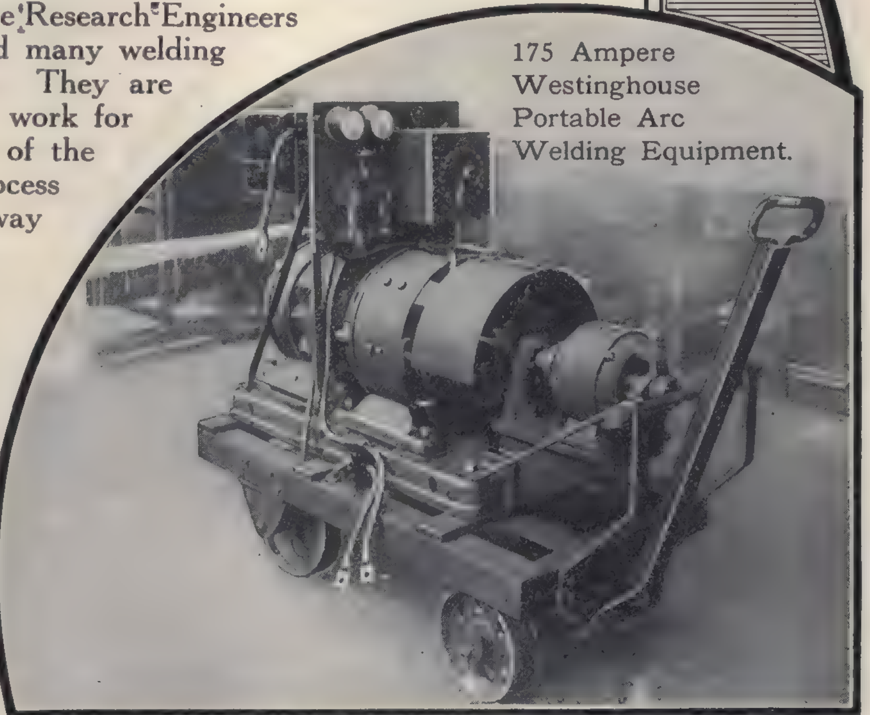
Electric Arc Welding, since its introduction to the Electric Railways, has made possible the economical repair and reclamation of hundreds of parts that could not be repaired by any other process.

Electric Arc Welding increased the scope of repair work for every division of the railway properties. It is used continually in the car shops, machine shops and in track construction and maintenance.

Westinghouse Arc Welding Equipments have been uniformly successful on railway work. A special control system permits a wide variety of welding from one welding equipment. The Westinghouse design includes features that assist the operator in obtaining good welds consistently.

Westinghouse equipments are light, rugged and substantial. One design is equipped with motor-drive for operation under trolley voltage conditions.

Westinghouse Research Engineers have developed many welding improvements. They are continually at work for the betterment of the arc welding process for electric railway maintenance.


175 Ampere Westinghouse Portable Arc Welding Equipment.

Westinghouse
Electric &
Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse

1922

The Greatest Year the SAFETY CAR Has Known

One of the many Safety Cars which are helping to solve the traffic problem in Brooklyn.

The Brooklyn Rapid Transit Company recently ordered 174 new sets of Safety Car Control Equipment.

SINCE 1916 the Safety Car has been an outstanding factor in the successful effort of the traction industry to weather a period of abnormal economic adjustment.

By resorting to a more economical form of service, as typified by the Safety Car, and without any sacrifice of passenger comfort or convenience, many companies found impending losses turned into substantial earnings.

Passing years and better times have not changed matters; the Safety Car today is enjoying a popularity that surpasses all records of the past.

1920 was regarded as the peak year in Safety Car expansion, but the first eight months of 1922 reveal a monthly average increase of 25 per cent over 1920 in orders for Air Brake and Safety Car Control Equipment, which is convincing proof that the Safety Car meets existing general conditions in the street railway field better than any other class of service yet developed.

We supply the Air Brake and Safety Car Control Equipment which is the fundamental characteristic of the Safety Car.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

Westinghouse Traction Brake Company Products

BRAKES FOR EVERY CLASS OF SERVICE

Schedule SM-3 (Straight Air)—For single cars in light, slow-speed city service.

Schedule SME (Semi-Automatic) — For single cars or two car trains in city service.

Schedule AMM (Combined Automatic and Straight Air)—For single cars or short multiple-unit trains in heavy city, suburban or interurban service.

Schedule AMU (Automatic)—For long trains in high-speed interurban elevated or subway service.

Schedule AMUE (Electro-Pneumatic)—For trains of any length in rapid transit, elevated or subway lines.

Variable Load Brake—For trains of any length on elevated or subway systems. Same as AMUE, plus features for varying brake cylinder pressure so as to obtain uniform retardation on empty, partially loaded, or fully loaded trains.

AIR COMPRESSORS

For Traction Service—DH "Bungalow" type, 10 to 25 cu. ft. displacement; DF type, 15 to 38 cu. ft. displacement; other types to meet special requirements.

Industrial Service — All types and sizes from 11 to 550 cu. ft. displacement; a.c. or d.c. motor; recommended for power stations, car barns, shops, yards, etc.

"TIGHT-LOCK" AUTOMATIC COUPLERS

Car and Air, or Car, Air and Electric Couplers for all classes of traction service.

"WABCO" PACKING CUPS

For air brake cylinders, door control engine cylinders, etc.

Air Brake Hose, Couplings and Fittings

Car Signal Equipment

Air Whistles

Air Cut-out Cocks

Air Gages

Brake and Operating Air Valves

Automatic Slack Adjusters

Air Strainers

AN AUTOMOTIVE AIR BRAKE

A new development providing better braking facilities for the safe and efficient operation of Motor Buses, Trucks, Touring Cars, Trackless Trolley Cars and Rail Motor Vehicles. See it on display at the Convention.

WESTINGHOUSE TRACTION BRAKES IN CHICAGO

CHICAGO depends chiefly on her fine elevated system for that measure of quick communication which is necessary to meet the economic and social needs of a 3,000,000 population.

With 238 miles of single and double-track line in service, the system is called upon to carry more than 500,000 passengers a day.

Rush hour periods require the operation of fast five, six and eight-car trains on a 30-second headway in the Loop and a headway of 60 seconds on diverging main lines.

Many factors combine to make it possible to maintain such exacting service, not the least of which is the excellent maintenance system which has always characterized the management of the lines; but the part played by Westinghouse Brake equipment is of prime importance.

The use of Westinghouse Air Compressors, the Universal Valve, 8-Inch Suction Strainers, WABCO Brake Cylinder Packing Cups, and other Westinghouse equipment, has made possible longer trains, increased speeds, reduced headways, and thus a greater passenger-carrying capacity than could have been realized in any other way with the same track mileage.

D-F Compressors

Westinghouse D-F Air Compressors on the Chicago elevated lines have given the same dependable, high-grade service which has marked their performance on other properties throughout the country. These are ruggedly built machines of light, compact design, furnished in sizes up to 38 cu. ft. displacement. They embody a number of distinctive features which result in the highest degree of serviceability at a gratifying reduction in maintenance expense.

8-Inch Suction Air Strainer

WABCO
Brake Cylinder Packing Cups

WABCO Brake Cylinder Packing Cups make their formal bow to the Traction Industry at this year's Convention. WABCO, however, has already been the means of saving many companies thousands of dollars in the last two years, at the same time effecting a marked increase in the efficiency of air brake operation, and therefore needs no special introduction at this late date.

WABCO is the new non-leakable, oil and water-proof composition packing which possesses unrivaled wearing qualities and practically eliminates maintenance cost as regards packing failures and replacements.

Westinghouse Traction Brake Company
General Offices and Works: Wilmerding, Pa.

"Meet us on the Pier"

WHAT WE WILL EXHIBIT

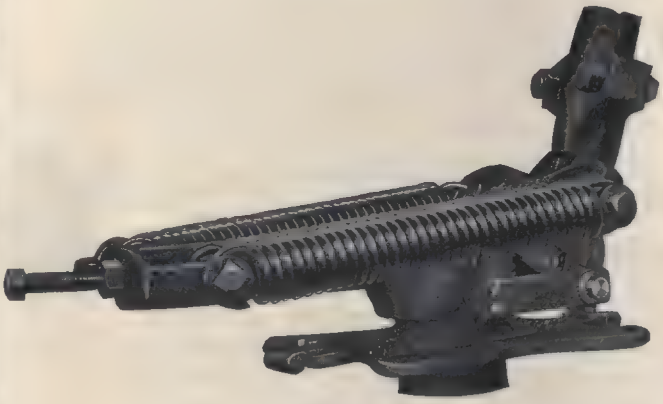
Visitors to the A. E. R. A. Convention in Chicago will find much of interest at the Traction Brake Booth. In addition to the new Automotive Air Brake for motor and trolley buses, our exhibit will include D-3-F and DH-16 Air Compressors; the 8-Inch Suction Strainer; K-1-A Car, Air and Electric Coupler; type "H" and S-6-A Compressor Governors, and the new WABCO Brake Cylinder Packing Cup. You are cordially invited to visit this display and take full advantage of the opportunity that will be offered to post yourself on the latest developments in the traction brake field.

WESTINGHOUSE TRACTION BRAKES

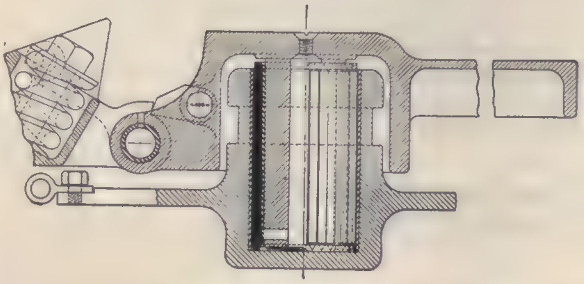
Nuttall

TROLLEY PARTS

for lower maintenance cost



U. S. 13-E Trolley Base



Foot and Swivel for U. S. 13-E Trolley Base

The Last Word in Trolley Bases

The Nuttall Form 13-E Trolley Base will be exhibited and explained at the A. E. R. A. Convention, Chicago. There are 13 different reasons and a hundred details to account for the instant popularity and wide adoption of this trolley base.

Don't fail to see it, and see it in operation.

It is already standard equipment on many electric railways.

Don't forget that Nuttall stands for finest grade trolley equipment as well as for efficient, long-life helical gears. The same progressiveness in design and accuracy of construction that characterizes our helical gear is found in NUTTALL trolley parts. Smoothness and efficiency in operation are combined with that cost-reducing, longer life factor.

Nuttall Trolley Harps are made of highest grade malleable iron, whose toughness insures ability to withstand the bumping and hammering against overhead construction.

Reduce maintenance costs and secure more satisfactory service with all Nuttall Trolley Parts.

Write Right Now

for complete information and set of bulletins on helical gearing and Nuttall trolley parts.

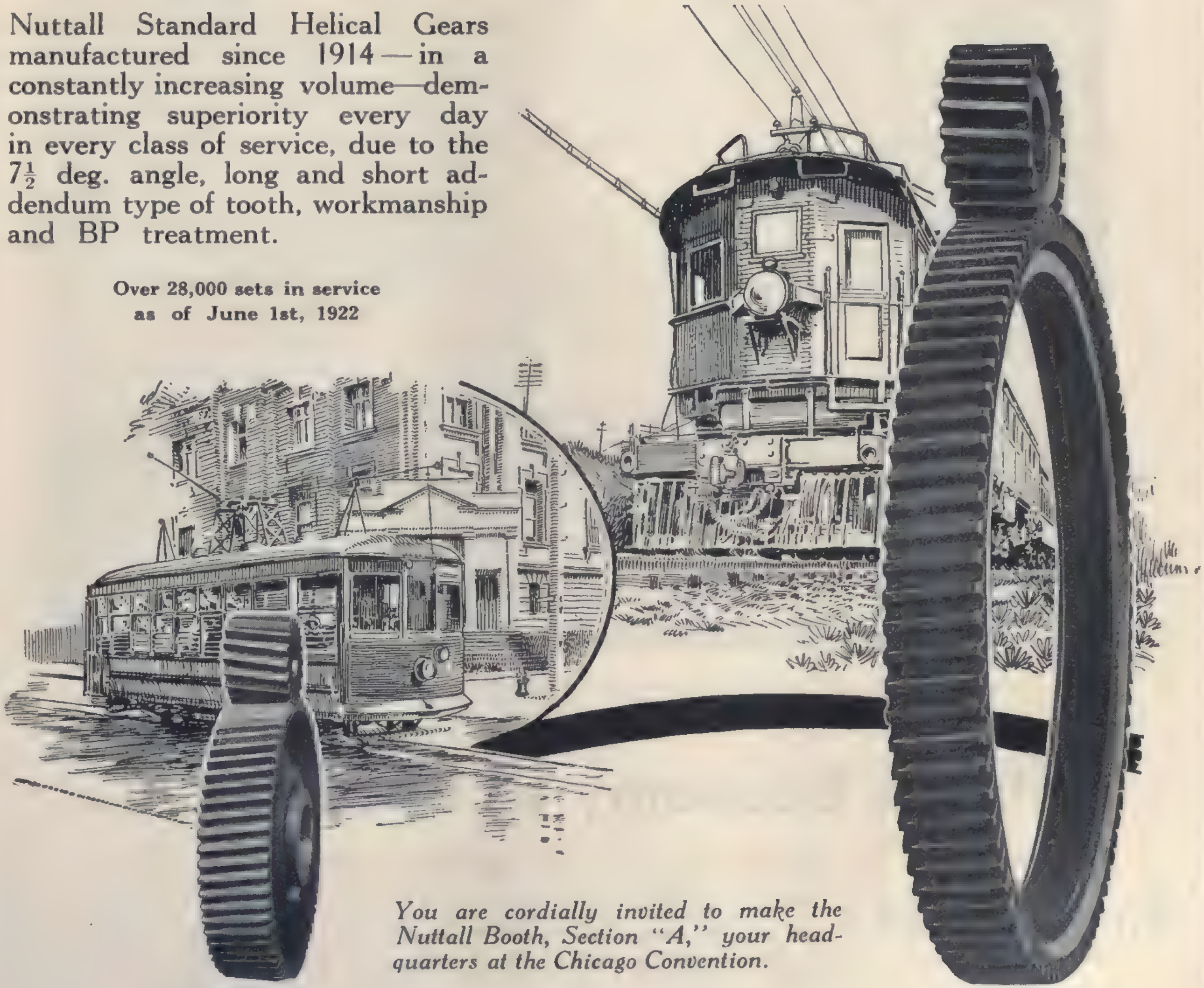
R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Standard Helical Gears

7½° Helix Angle

Nuttall Standard Helical Gears manufactured since 1914—in a constantly increasing volume—demonstrating superiority every day in every class of service, due to the 7½ deg. angle, long and short addendum type of tooth, workmanship and BP treatment.

Over 28,000 sets in service as of June 1st, 1922



You are cordially invited to make the Nuttall Booth, Section "A," your headquarters at the Chicago Convention.

MEMBER
AMERICAN ELECTRIC RAILWAY ASSOCIATION
AERA
1922

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products.

In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Nuttall

Phono-Electric

Chestnut Street at 32nd St., Philadelphia. Phono-Electric Trolley (4/0) installed on main line, where an average of 700 cars per day pass under this wire.

Shows Economy in Philadelphia

"Bridgeport" BRASS CO. U.S.A. U.S.A. TRADE MARK

When they installed the first Phono-Electric trolley in Philadelphia several years ago it was in the nature of a trial. Most of it is still in place and good for years to come. The results of these trials offered such convincing proof of the real economy of Phono-Electric overhead, that now they use it at such crucial and busy traffic points as those shown above. Around the curves of the familiar City Hall Loop, in the very center of the city, where a tie-up would mean tremendous loss, Phono-Electric trolley gives uninterrupted service.

Phono-Electric—The Answer to Why—is WEAR!

Bridgeport Brass Company
Bridgeport Connecticut

Phono-Electric

City Hall Square, Philadelphia. Phono-Electric Trolley (4/0) installed on all curves around the square, where an average of 1500 cars per day pass under this wire.

It Saves in Several Ways

By a useful life, at least twice that of hard-drawn copper, Phono-Electric is of itself a more economical material to use. Then, too, the erection cost occurs less often—an item often overlooked when materials cheaper in first cost are used. And finally, the toughness and durability of Phono-Electric are such that those costly line breaks and the accompanying delays and losses of traffic seldom occur. The inreasing use of Phono-Electric trolley by the biggest systems all over the country indicates its value as an economical and serviceable material.

Phono-Electric—The Answer to Why—is WEAR!

MEMBER
AMERICAN ELECTRIC RAILWAY ASSOCIATION
AERA
1922

Bridgeport Brass Company
Bridgeport 3335 **Connecticut**

International Treatment

THE seasoning and preservation of International Ties is at all times under the direct supervision of expert men who have given a life-time study to the treatment of timber from this territory.

The treating plant is equipped to treat by any recognized process. There is installed every modern mechanical device to assure accuracy. The cylinders are large, having a total capacity for treating 300,000 ties per month.

Efficiency and thoroughness dominates every movement in the treating process. High quality, dependable treatment means deep penetration with high grade creosote oil. This is what the International offers.

International Service includes the production of sound quality ties, carefully inspected, graded in strict accordance with A. R. E. A. specifications, carefully seasoned, treated to get good penetration and loaded ready for your distribution.

The tie that lasts longest is least expensive.

International Creosoting and Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

"WELCOME" is the first thing you'll find at the O-B Exhibit

Every A. E. R. A. Convention that has had exhibits, has had an O-B Exhibit.

This year, at spaces 1-6, Section D, we know that you will find many things of interest.

Among the trolley materials you will discover many proofs of progress. For instance, the Improved Type A Ear with the wire saving under run will be there. So will the Improved Type C Splicer. Several new cam tip devices will be on display. And you will find a miniature installation of National Trolley Guard.

You will have an opportunity to examine the latest development in electric arc weld bonding —O-B AW-7 and AW-8 Rail Bonds. In addition you will see samples of all the other O-B Bonds.

Representative types of High Tension Porcelain Insulators and Third Rail Insulators will be exhibited.

Spaces 1-6
Section D.

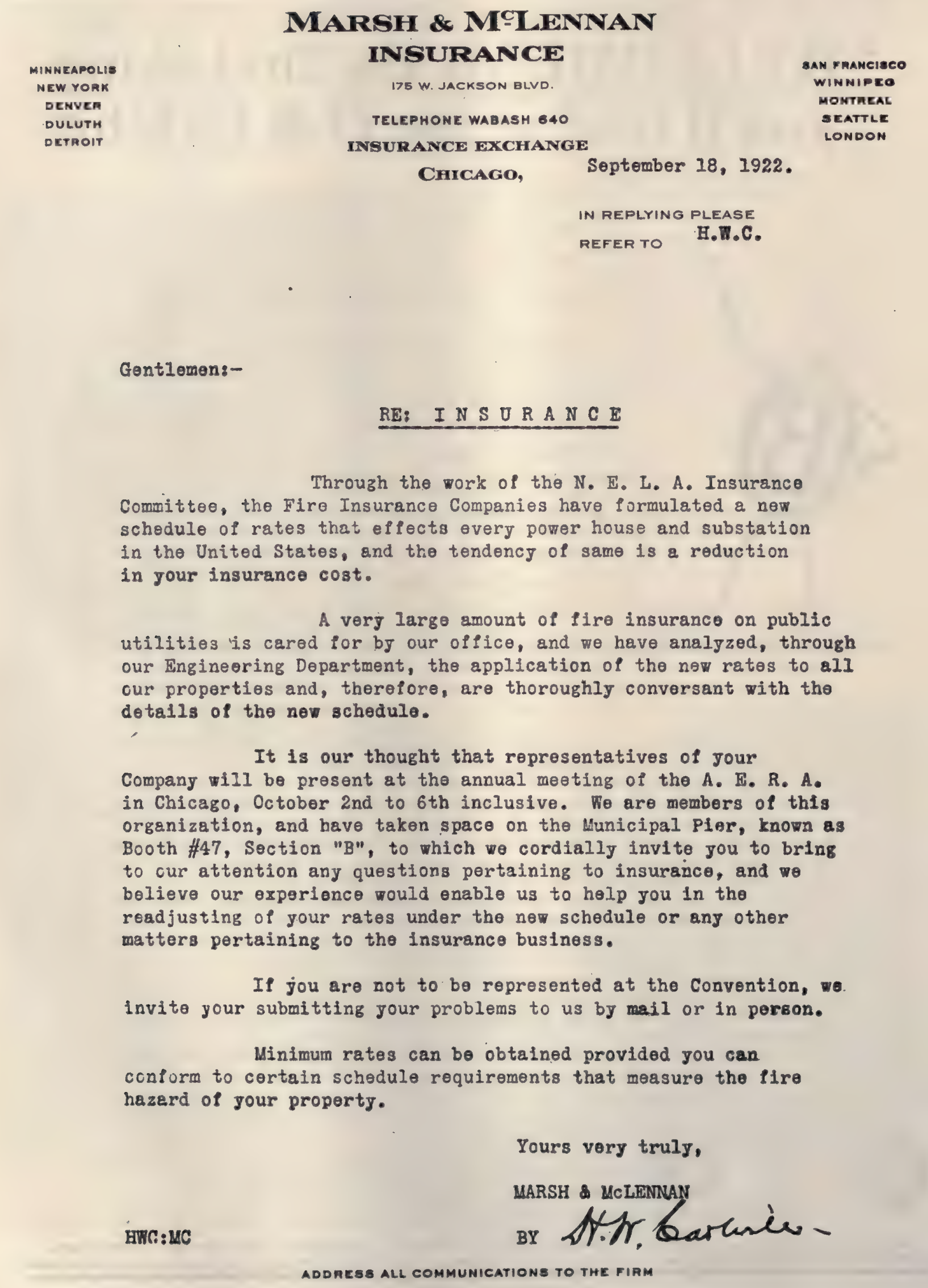
A fully equipped pair of Tomlinson Automatic Couplers will be operating and will demonstrate how they connect cars, air lines and electric circuits simultaneously and automatically. There will also be working displays of other O-B Car Equipment such as Catchers, Retrievers and Bases and Crouse-Hinds Imperial Headlights.

Above all, you will find a cordial welcome awaiting you at the O-B Exhibit. Come in.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

The Ohio B Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators



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SEATTLE
LONDON

September 18, 1922.

IN REPLYING PLEASE
REFER TO H.W.C.

Gentlemen:-

RE: INSURANCE

Through the work of the N. E. L. A. Insurance Committee, the Fire Insurance Companies have formulated a new schedule of rates that effects every power house and substation in the United States, and the tendency of same is a reduction in your insurance cost.

A very large amount of fire insurance on public utilities is cared for by our office, and we have analyzed, through our Engineering Department, the application of the new rates to all our properties and, therefore, are thoroughly conversant with the details of the new schedule.

It is our thought that representatives of your Company will be present at the annual meeting of the A. E. R. A. in Chicago, October 2nd to 6th inclusive. We are members of this organization, and have taken space on the Municipal Pier, known as Booth #47, Section "B", to which we cordially invite you to bring to our attention any questions pertaining to insurance, and we believe our experience would enable us to help you in the readjusting of your rates under the new schedule or any other matters pertaining to the insurance business.

If you are not to be represented at the Convention, we invite your submitting your problems to us by mail or in person.

Minimum rates can be obtained provided you can conform to certain schedule requirements that measure the fire hazard of your property.

Yours very truly,

MARSH & McLENNAN

BY H. W. Carlile

HWC:MC

ADDRESS ALL COMMUNICATIONS TO THE FIRM

Annual Convention Number

ELECTRIC RAILWAY JOURNAL

Vol. 60, *No.* 13 HENRY W. BLAKE, Editor *Pages* 417-496

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MEMBER AMERICAN ELECTRIC RY. ASSOCIATION 1922

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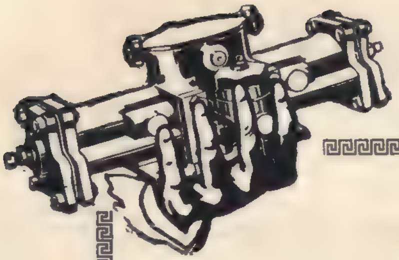
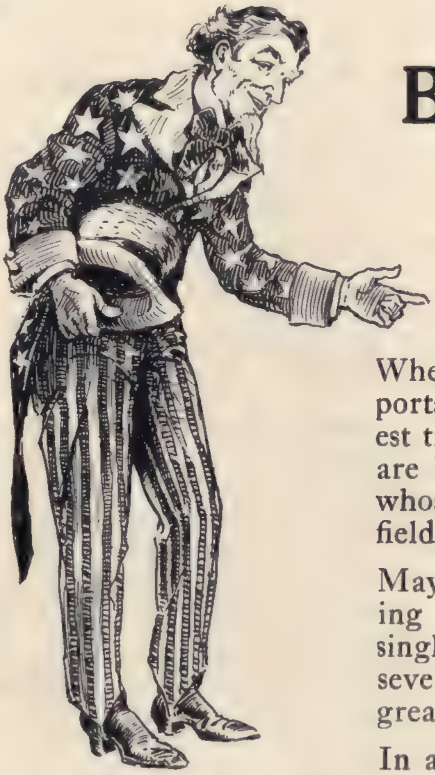
(Published in Chicago)
American Machinist—European Edition
(Published in London)

The annual subscription rate is $4 in the United States, Canada, Mexico, Alaska, Hawaii, the Philippines, Porto Rico, Canal Zone, Cuba, Honduras, Nicaragua, Dominican Republic, Salvador, Peru, Colombia, Bolivia, Ecuador, Argentina, Spain and Shanghai, China. Extra foreign postage in other countries $3 (total $7, or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid, to any part of the world, 20 cents.
Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.

Circulation of this issue 6250

Advertising Index—Alphabetical, 226; Classified, 220, 222, 224; Searchlight Section, 114, 115, 116, 117





For Uncle Sam's
Biggest Municipal
DETROIT

When worried about the future of mass transportation in cities, don't forget that the greatest trolley improvements in the United States are being made at the urge of an executive whose fortune was earned in the *automobile* field.

Mayor Couzens knows, just as his able operating staff knows, that the pneumatized car singly or in trains is the only way to carry the severe industrial surges of population in a great city.

In addition to the large number of standard safety cars and 50 "Peter Witts" on which the National Pneumatic door engine is standard, the Detroit Municipal Railway will soon have

200 Peter Witt Cars with National Pneumatic Apparatus

—for surface operation along Woodward Ave. and other highways whose traffic is actually comparable with some of the heaviest non-surface routes in the world.

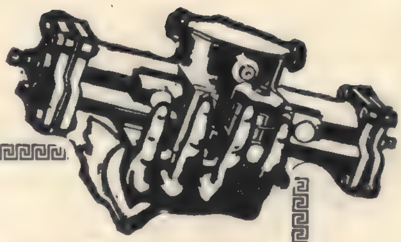
National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control
Door and Step Operating Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control

50 Church Street, New York
Edison Bldg., Chicago
Works: Rahway, N. J.

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.



For Johnny Canuck's Biggest Municipal TORONTO

And across the border, another Couzens is directing the rehabilitation of the system acquired last year by the Queen city of the Dominion.

Cars of several modern types are being used most successfully, and mark again that real big business is to be done with the pneumatized trolley car.

It is for the great trunk lines of this pushful, thriving muncipality that there have been ordered

701 Cars equipped with National Pneumatic Apparatus

This order includes: 351 old cars remodeled with door engine, 190 Peter Witts in service, 60 Center Entrance Trailers in service, 100 New Peter Witts on order.

National pneumatic apparatus is favored not only because of its record in the United States but also because of its previous satisfactory performance right in Toronto itself.

National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control
Door and Step Operating Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control

50 Church Street, New York
Edison Bldg., Chicago
Works: Rahway, N. J.

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

They are out for speed with safety in

PHILADELPHIA

Philadelphia's slowness may be tradition, but it isn't fact.

By far the greatest portion of Philadelphia surface rolling stock is pneumatized via the National Pneumatic route. And so is all the present and all the requisitioned rolling stock for the rapid transit lines.

Not only the Market Street subway-elevated route on which National Pneumatic equipment *has* been making good for years, but also on the new Frankford Elevated Line on which National Pneumatic equipment is *going* to make good for years to come.

50 National Pneumatic equipped
Cars Now in Service

50 Additional Cars going through

Thus has been assured a down-to-the-second start for America's newest rapid transit system.

National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control
Door and Step Operating Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
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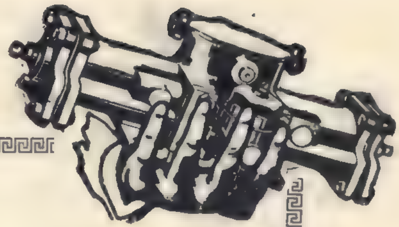


More and more for the nickel in

NEW YORK

War wages or no, the extension of the Interborough Rapid Transit Company's lines means an ever larger value for the nickel fare.

It's one of the world's wonders how that fare is maintained; but here is revealed one of the secrets of a management that never hesitates to pioneer in the adoption of any plans that combine economy with the safety and celerity that are needed in New York's subways as nowhere else in the world. One plan is the use of

1500 National Pneumatic Outfits
Multiple Unit Door Control Type

With these, a standard ten-car train is handled better now with five men than formerly with nine. That's why the Interboro can stretch a nickel so far.

National Pneumatic Company, Inc.
Designers, Builders and Installers
Door and Step Control
Door and Step Operating Mechanisms
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control
50 Church Street, New York
Edison Bldg., Chicago
Works: Rahway, N. J.
Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

And now we come to the story of

CHICAGO

There was a time when the air-operated door was deemed feasible only for rapid-transit service.

It was then that the Chicago Elevated lines installed many hundreds of pneumatic engines.

But in these days it is recognized that the pneumatized car has even more advantages in surface than in non-surface operation, for besides speeding up loading it facilitates better fare collection. That's why the Chicago Surface lines after operating 110 double truck cars and 100 trailers for two years are now installing

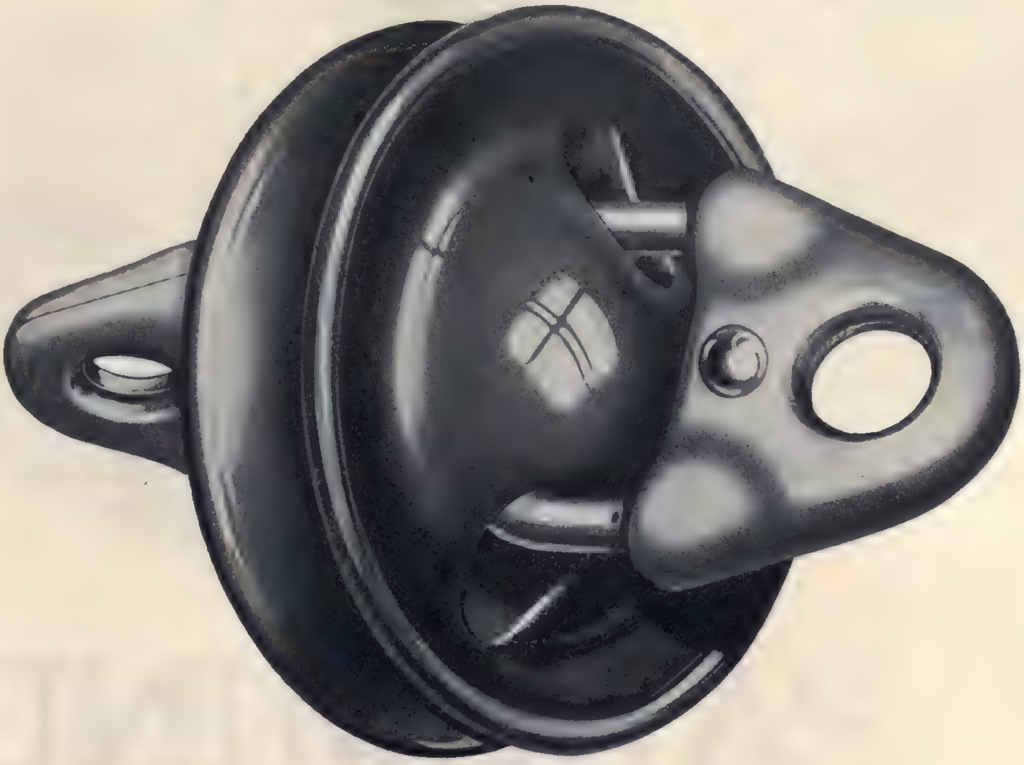
National Pneumatic Outfits on 69 Double-end Cars for heavy service and 45 One-Man Cars for light service.

Inquire about these cars at the Convention. They prove that there's many a good kick in mass transportation by electro-pneumatics!

National Pneumatic Company, Inc.
50 Church Street, New York Edison Bldg., Chicago
Works: Rahway, N. J.

The "BABY" LINK-TYPE

A Light Duty Thomas Link-Type Hewlett Insulator



Catalog No. 11026

Typically A Railway Design

HERE is an insulator of the strain type which will fit nicely into your construction plans. It is of the same general style as the Thomas LINK-TYPE Hewlett Insulator excepting that No. 11026 is smaller, being only 6 inches in diameter. Soft copper connecting links of 3/0 gauge are used as in the larger design, and are held fast by two piece metal clamp adapters. The Clamp Adapters are well rounded and will readily receive wire-thimble or cable without injury. The ultimate mechanical strength of Insulator No. 11026 is 6,000 lbs. It is rugged but light in weight; simple to assemble but durable.

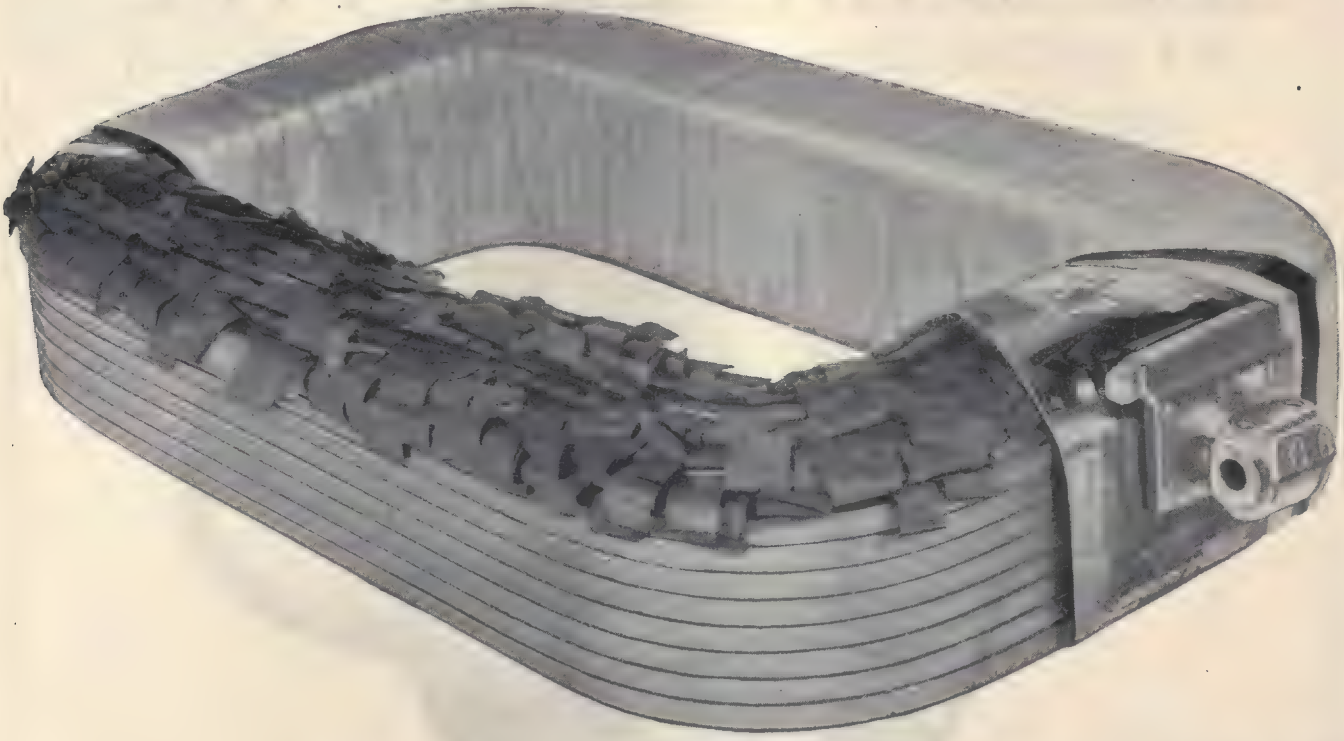
Ask for Bulletin of 11026

This is but one design in hundreds that make up the THOMAS QUALITY line of Dependable Insulators. They serve your purpose best because they represent careful planning by capable engineers; accurate workmanship by skilled craftsmen and because they are backed by the country's oldest manufacturer of High Tension Insulators.

INSIST ON "THOMAS QUALITY" INSULATORS
The American Standard in Electrical Porcelain since 1873

The R. THOMAS & SONS CO.
East Liverpool, Ohio
New York Boston Chicago London
Western Electric Co., Inc. on the Pacific Coast
Northern Electric Co., Ltd. in Canada

50 to 60% LESS WEIGHT



ALUMINUM

Service on more than 40 electric railways in the U. S. has proven that aluminum field coils possess many outstanding advantages.

(1) They are less affected by moisture, since the aluminum oxide insulation is an integral part of the conductor which it protects.

(2) They are less affected by heat, since the heat generated is quickly distributed by the large square wires and because they contain no cotton insulation to char or bake out.

(3) There is less chafing and less terminal trouble because of the much lighter weight of these coils.

(4) For many types of coils there is a distinct advantage in price. The external dimensions, contour and terminals of these coils are standard—a copper coil can be lifted and a Lind Aluminum Coil installed without any changes in circuits.

Used Since 1907 in Europe

MUCH LONGER LIFE

Electrical Characteristics

The principal advantages of this coil are permanent insulation qualities and low weight. It is easily possible, by renewing coils on some cars, to reduce the weight of an interurban car by 2,000 pounds, and of a city car by 600 to 1,200 pounds.

These coils are wound with the same number of turns to give the same field strength as the coils they replace.

The use of oxidized square aluminum wire to replace insulated round wire or copper strap not only permits employing sizes having ample carrying capacity within commercial tolerances but also the square aluminum affords an added advantage of quick heat conduction to the coil exterior thereby materially lowering hot-spot temperatures.

FIELD COILS

The Process

This coil is first wound of bare square aluminum wire without separation between turns, but with clipped paper separating the layers. The terminal arrangement and insulation with mica is similar to copper coils, a tinning with aluminum solder preventing electrolysis at the terminals.

After being wound, the bare coil is heated and then immersed in the oxidizing solution. Next it is heated and dipped in an insulating varnish solution. Then it is externally wrapped with webbing, Micanite, oiled bias tape, and again with webbing. The final treatment is dipping and baking in the insulating varnish.

Let us quote on your requirements or answer detailed questions

ECONOMY ELECTRIC DEVICES CO.
General Sales Agent, Lind Aluminum Field Coils, Sangamo Economy Meters
L. E. Gould, Pres., Old Colony Building, Chicago, Illinois

Already on More Than 40 American Railways

Announcement

About January 1, 1923
We will be in production on

Electric Railway Cars
Non-Rollicking Trucks
High-Grade Motor Bus Bodies

MISSOURI CAR COMPANY

310 Chemical Building, St. Louis, Missouri

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NOARK

EVERY FUSE TESTED

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Introducing

NOARK NON-INDICATING FUSES

So well known are NOARK Fuses in every branch of the electrical industry that we need here only express our appreciation of the general recognition of leadership accorded them throughout the electrical field. In return for that recognition it is our constant effort to maintain a service closely responsive to new and well founded fuse requirements.

In accord with this policy, we have developed and now offer to the trade, and to electrical service at large, the latest addition to the NOARK line—the new NOARK ***Non-Indicating Fuses.***

In every detail of quality, construction and dependable performance, these new fuses fully justify users in expecting from them the same consistently reliable service they have learned to expect from all NOARK products. Look for the NOARK label on every fuse you buy. See illustration at bottom of this page, showing the exterior appearance and label of NOARK ***Non-Indicating*** Fuses—with data on sizes.

The Johns-Pratt Company, Hartford, Conn.

New York
41 East 42nd St.

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161 Summer St.

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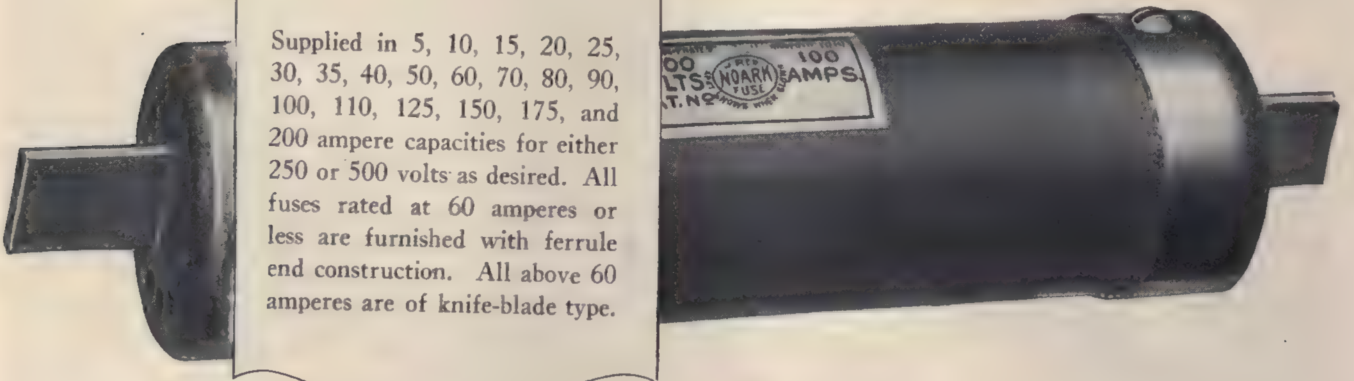

Supplied in 5, 10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, and 200 ampere capacities for either 250 or 500 volts as desired. All fuses rated at 60 amperes or less are furnished with ferrule end construction. All above 60 amperes are of knife-blade type.

Johns-Pratt

NOARK FUSES AND PROTECTIVE DEVICES VULCABESTON PACKING AND INSULATION JOHNS-PRATT MOLDED PRODUCTS

TRACK ROADWAY AND LINE MATERIAL

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Kit No. 24

FIRST AID or FIRST *AID?*

DESPITE safety devices and personal care, accidents *will* happen to your employees. And when they do, are you prepared to render *Efficient* First Aid?

In any such emergency the assistance given must not only be prompt, but proper. No aid at all is better than that offered by incorrect, unhygienic treatments and dressings usually found in the miscellaneous contents of the ordinary first aid cabinets.

Compact Emergency Dressing Kits

solve every First Aid problem, in the safest, surest and most economical way:

Safest—because each dressing or treatment is sealed in an individual container; no chance for infection.

Surest—because each is designed for a definite injury or collapse, and plainly marked; no chance for a mistake.

Economical—because each is sufficient for its purpose; no chance for waste.

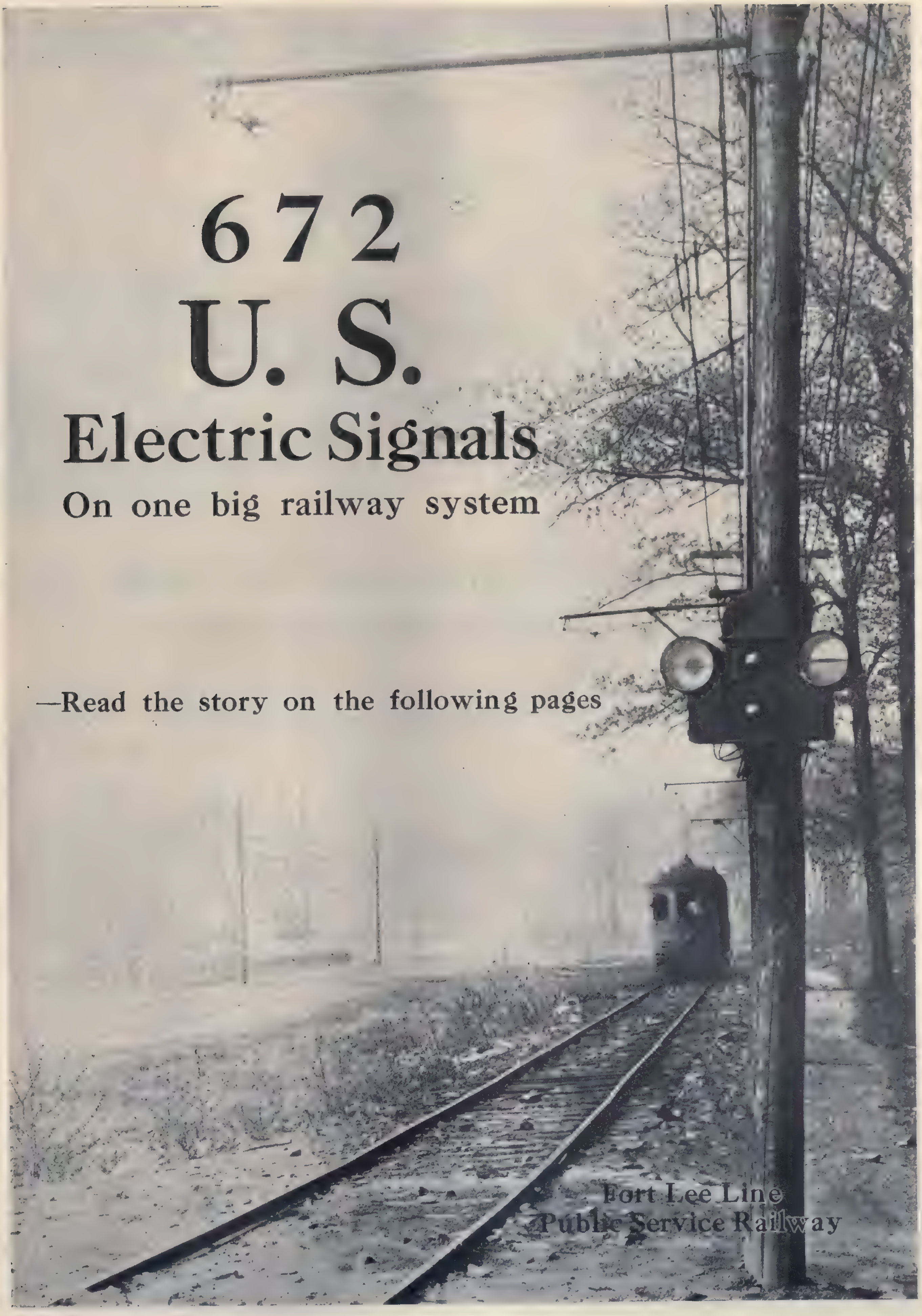
C. E. D. Kits come in all sizes, from the small packets designed for individual and isolated field workers to large cabinets for departmental or organization use. The contents of each are determined entirely by the nature of the hazards to which the users are subjected.

Send for our booklet describing the Kits in detail, giving complete specifications and prices, not only on the regular assortment, but also on any special combinations your business may require.

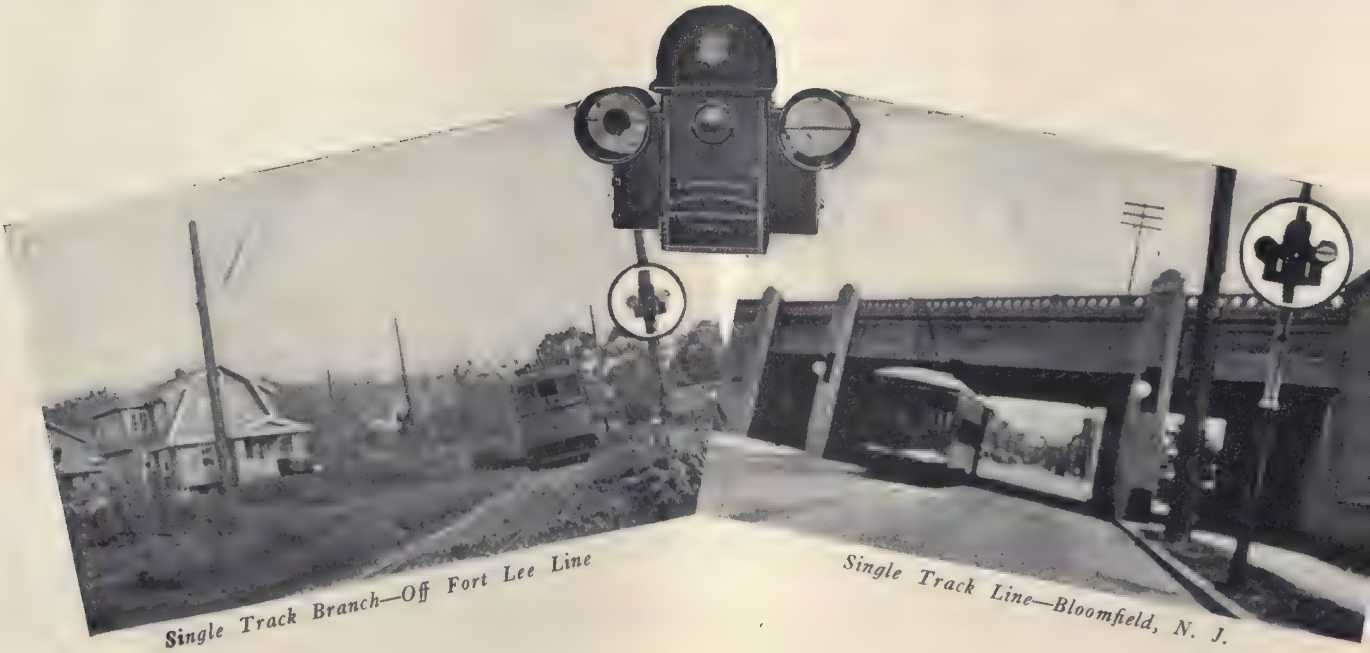
FIRST AID SPECIALTY CO., INC.

Makers of Compact Emergency Dressing Kits

34 HUBERT STREET - - - - - - - NEW YORK CITY


672
U. S.
Electric Signals
On one big railway system
—Read the story on the following pages
Fort Lee Line
Public Service Railway

672 U.S. Electric Signals



Single Track Branch—Off Fort Lee Line

Single Track Line—Bloomfield, N. J.

Public Service Railway Company

Uses them for safe single-track operation

Passing Track, Tenafly, N. J.

Seventeen years ago, the first U. S. Electric Signals were installed on the New Jersey & Hudson River Ferry Line shortly afterwards leased by the Public Service Railway Company of N. J. This Company experimented with various signals until 1910 —*then standardized on U. S. Electric Signals.*

Operating as they now do, nearly one thousand miles of track, much of it single-track, with fast and frequent service, U. S. Electric Signals are used at passing tracks, branch-offs, wyes and in various special situations where their wide adaptability makes them invaluable.

You will find them in the smaller cities where one-man cars are operated;—and in open suburban country, where heavy speed cars are driven on fastest schedules.

U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

United States Elect

West Newton

Western: Frank F. Bodler, Monadnock Bldg., San Francisco

on one big Railway System

Down the Palisades, N. J.

Down the Palisades, N. J.

Public Service Railway Company

Uses them for double-track spacing protection

Fort Lee Ferry, at the foot of the gigantic Palisades, is reached by several lines of the Public Service Railway. Down the face of this immense cliff, on steepest grades, winding around hairpin turns and absolutely blind corners, these cars proceed in perfect safety.

Why?—Because they are protected from running up on each other by means of U. S. Electric Signals. Placed at the top of the hill, and at critical points down the line, these U. S. Electric Signals, acting like railroad block signals, automatically space the down-bound cars without human despatching or supervision.

U. S. Electric Signals will adequately protect any blind corner and sharp turn. Considered as insurance against collision, the cost is negligible.

Down the Palisades, N. J.

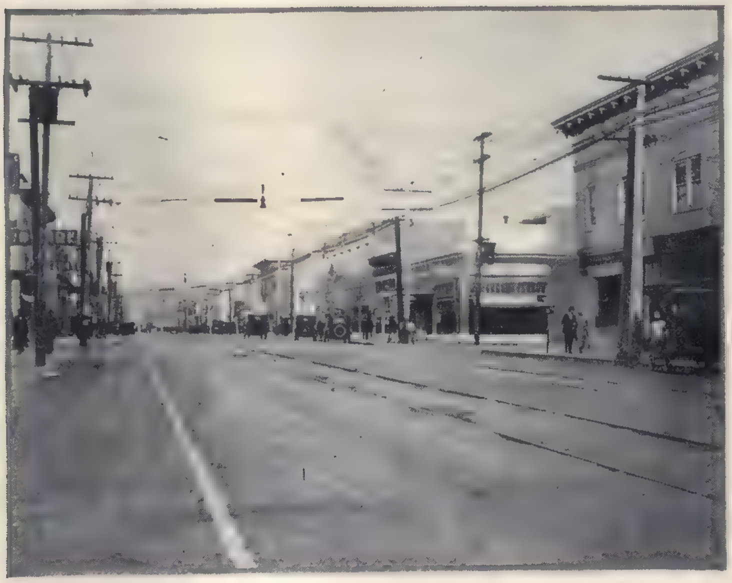
ric Signal Company

Massachusetts

Foreign: Forest City Electric Services Supply Co., Salford, England

ELRECO

Before



Look at this scene—McDonald Avenue in Richmond, California! This is how it appeared prior to June 15, 1922, when Elreco Poles were installed. Even the most indifferent observer would be unfavorably impressed by the numerous poles and myriads of overhead wires. Up and down both sides of the streets, crossing and re-crossing at every arc light and at every corner, the very sunlight itself was almost obscured by this overhead snarl of wire threads. The light from the old-fashioned arc light was weak and poorly distributed. The cost of upkeep of the numerous poles and criss-crossed wires was a burden on all the utilities involved.

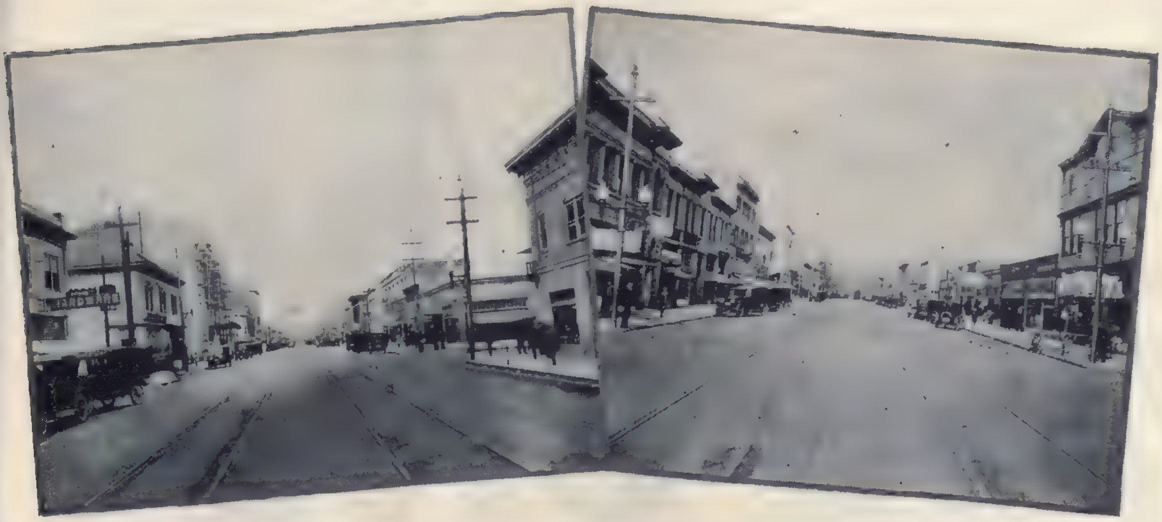
Install Elreco Combination

The Electric Railway

Cincinnati
New York Office:

POLES

After

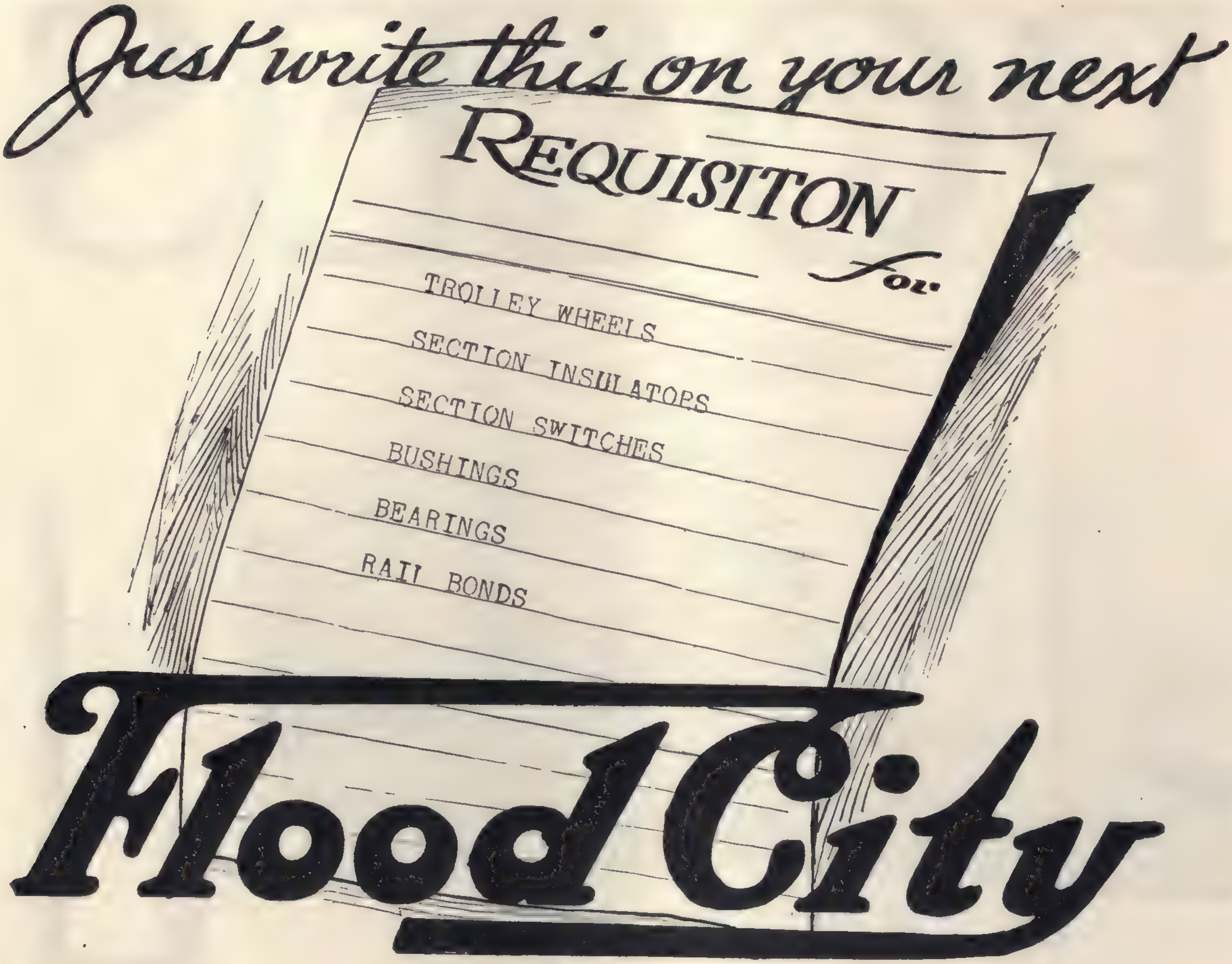


Witness the transformation shown above. The left-hand view is at the same point after Elreco combination railway poles and lighting units were installed. The right-hand view was taken at another point. Note the clear, unobstructed view as well as the wonderfully improved appearance of the streets. The lighting effect at night creates another "Great White Way." Elreco Poles accomplished this for Richmond, California, as they have accomplished it in nearly one hundred other cities, large and small. Elreco Poles will work wonders in the appearance of your own city. Distributed among the several utilities involved, the first cost is trifling and the savings in maintenance are immense.

Railway and Lighting Poles

Equipment Company

Ohio
30 Church Street

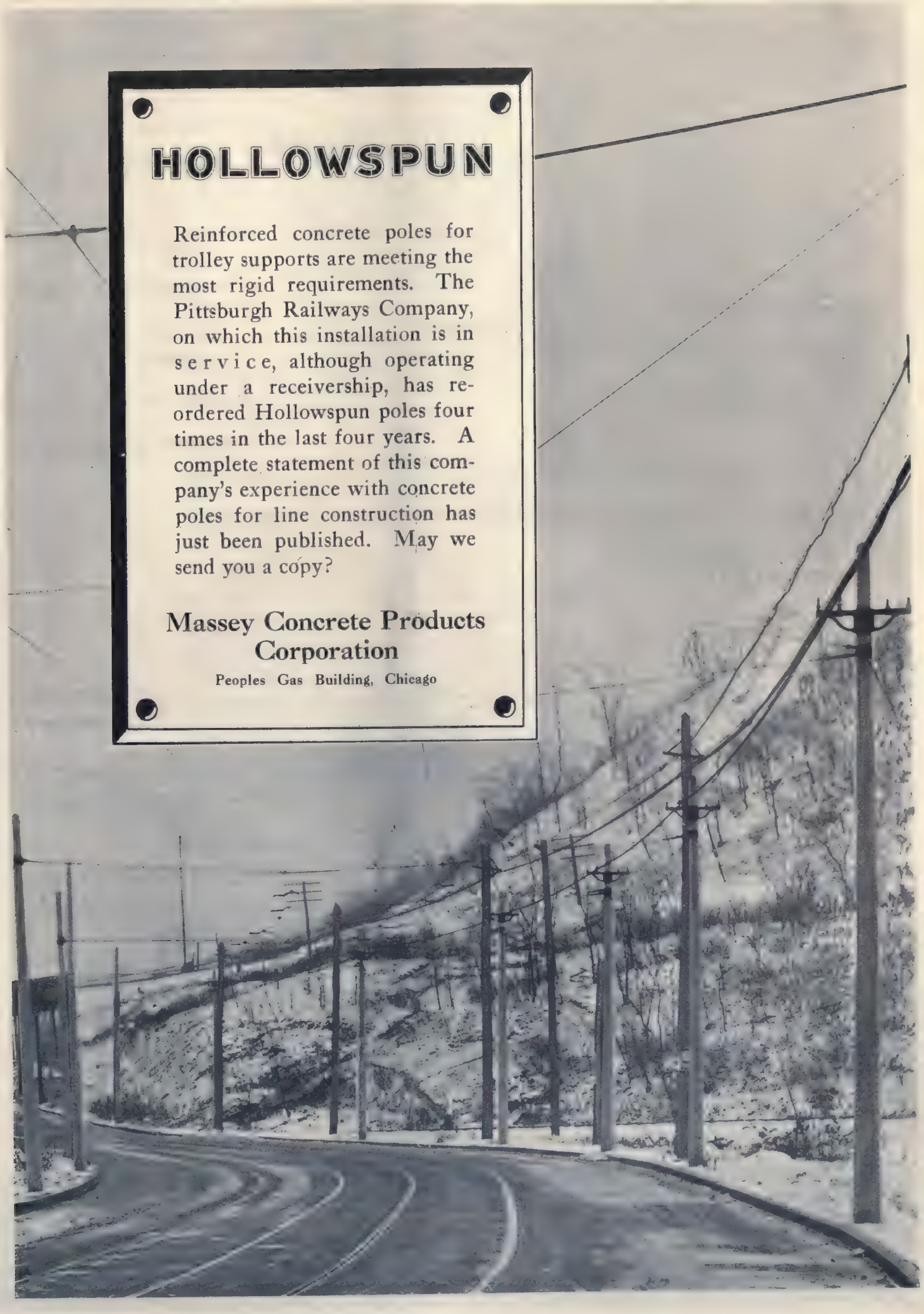


We like the fellow who'll "try anything once"—for sooner or later he's going to try Flood City Trolley Line Specialties. And when he does he's going to do what the others did after their first trial of Flood City—STICK TO FLOOD CITY.

If you will write "Flood City" on your next requisition for Trolley Wheels, Section Insulators, Section Switches, Bushings and Bearings and "Everlasting" on your order for Rail Bonds you will see why the others have stuck to the Flood City.

Flood City Material got its baptism in the rough and tumble of coal mining service. It therefore stands the gaff in electric railway service.

Flood City Mfg. Company
Johnstown, Pa.

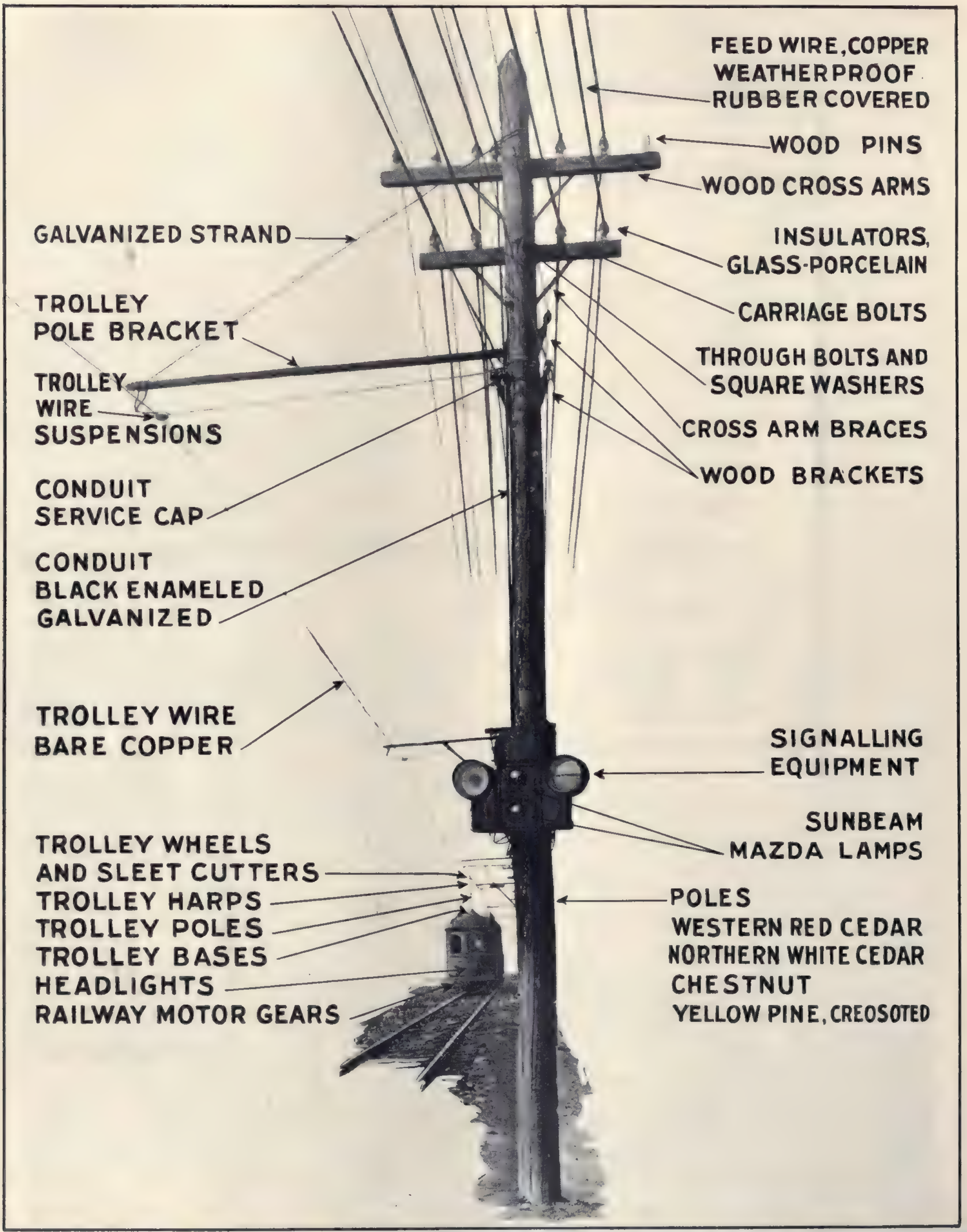


HOLLOWSPUN

Reinforced concrete poles for trolley supports are meeting the most rigid requirements. The Pittsburgh Railways Company, on which this installation is in service, although operating under a receivership, has reordered Hollowspun poles four times in the last four years. A complete statement of this company's experience with concrete poles for line construction has just been published. May we send you a copy?

Massey Concrete Products Corporation

Peoples Gas Building, Chicago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Western

Every Supply Item You Want Is As Near You As Our Nearest House

You can get quickly from our House near you any and all the electrical supplies you want. It maintains large stocks of standard products. The shipping distance to you is short. Among the standard items it carries are:

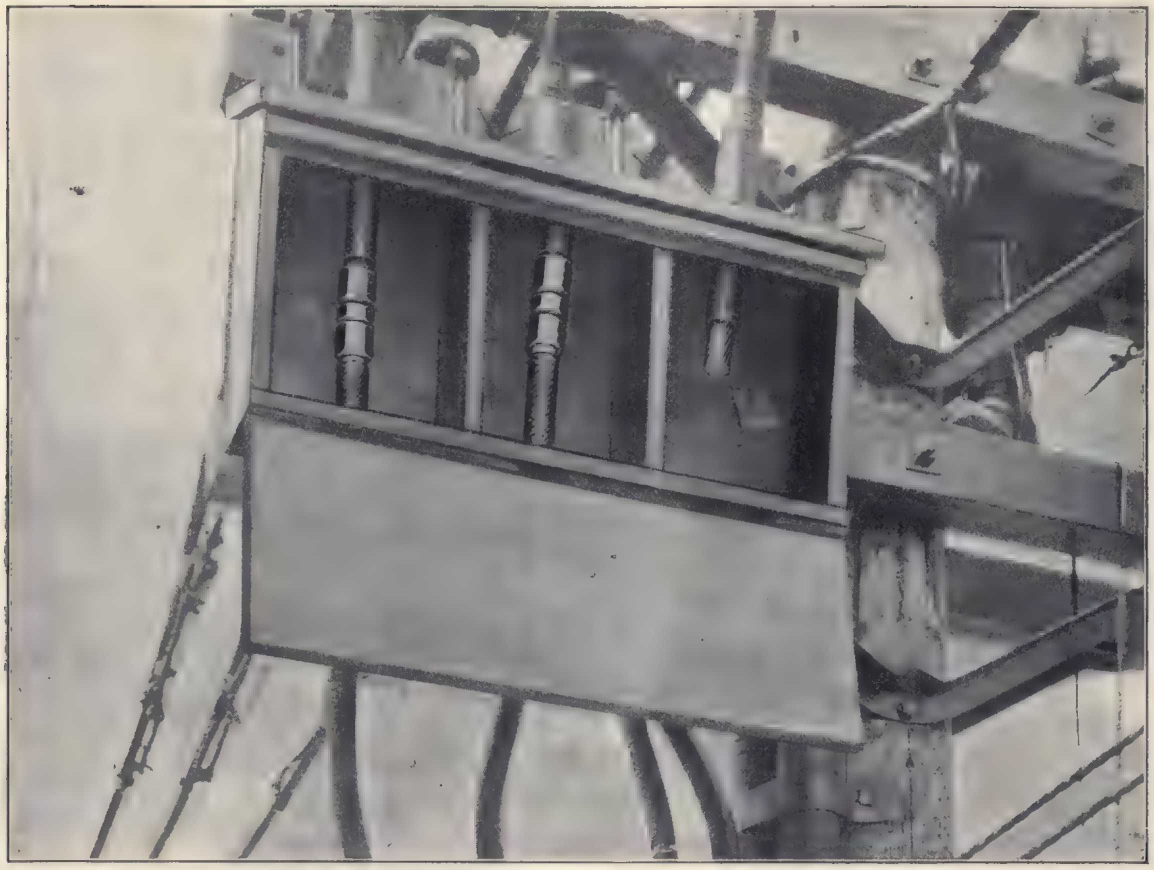
Amazon Friction Tape
Strain Insulators
Deltabaston Wire
Victor Friction Tape
Kalamazoo Trolley Wheels

The stock of these and other supply items near you make it unnecessary for you to carry large stocks yourself. You can save time in receiving goods. You can save money, for we carry the stock.

48 of the principal cities contain Western Electric Houses capable of rendering this service to you.

Western Electric Company
Offices in All Principal Cities

Electric



NO SOLDER—*just a monkey wrench*

THE PHOTOGRAPH shows part of a pole on the overhead lines of the Detroit M. O. Street Railways, Detroit, Mich. The pole carries the power leads from the Howard Avenue sub-station and in the box is shown the method of using 1,000,000 C. M. straight 2-way Dossert connectors for connecting the underground return system to the overhead system. In case of trouble or test work the negatives can be opened in very little time. This is a very large labor-saving factor over the old method of making and soldering the joints, and a big saving as compared with the use of switches.

The M. O. system is using Dossert connectors (cable tap style) on all feed-in spans with very fine results. The old method of removing feed span connections from feeder would mean unsoldering and un-serving wrap joint which would mean a delay of at least three-quarters of an hour. With Dossert connectors the same job can be accomplished in five minutes.

(Signed) E. M. Booth,
Superintendent of Lines.

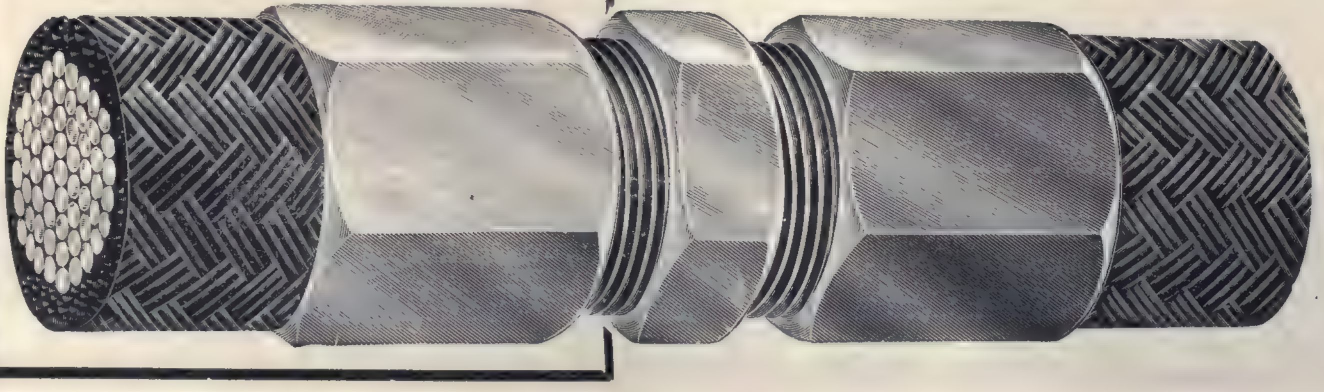
DOSSERT

Solderless Connectors

Tests which have been made from time to time by users of Dossert connectors show that the connectors run at as low temperature as enabled by the wires connected to them.

Send for Catalog Fifteen.

Dossert & Company
H. B. LOGAN, President
242 West 41st Street, New York



White has the Owners

The following list of 134 Electric Railway, Light and Power companies operate 969 White Trucks in fleets of two or more. Hundreds of other companies operate single units. This comprehensive fleet list is the industry's indorsement of White Truck performance.

No. Trucks		
5	Adirondack Power & Light Corp.	Glens Falls, N. Y.
3	Alabama Power Co.	Birmingham, Ala.
2	Arkansas Valley Ry., Light & Power Co.	Pueblo, Colo.
2	Arrowhead Reservoir & Power Co.	San Bernardino, Cal.
22	Baltimore Transit Co.	Baltimore, Md.
4	Beverly Gas & Electric Co.	Beverly, Mass.
4	Birmingham Ry., Light & Power Co.	Birmingham, Ala.
6	Blackstone Valley Gas & Electric Co.	Pawtucket, R. I.
2	Blue Ridge Power Co.	Charlotte, N. C.
38	Boston Elevated Ry. Co.	Boston, Mass.
3	Bronx Gas & Electric Co.	New York City
4	Buff & Bennett Power Co.	Hawkinsville, Ga.
2	The California-Oregon Power Co.	Medford, Ore.
8	Carolina Power & Light Co.	Raleigh, N. C.
11	Carolina Public Service Co.	Charleston, S. C.
9	Central Maine Power Co.	Augusta, Me.
5	Central Massachusetts Electric Co.	Palmer, Mass.
3	Charleston Consol. Ry. & Lighting Co.	Charleston, S. C.
4	Chicago, North Shore & Milwaukee R. R.	Chicago, Ill.
52	Cleveland Electric Illuminating Co.	Cleveland, Ohio
14	Cleveland Railway Co.	Cleveland, Ohio
6	The Connecticut Co.	New Haven, Conn.
12	Consol. Gas, Elect. Light & Power Co.	Baltimore, Md.
6	Counties Gas & Electric Co.	Norristown, Pa.
4	Dallas Railway Co.	Dallas, Tex.
2	Danbury & Bethel Gas & Elect. Light Co.	Danbury, Conn.
5	Dayton Power & Light Co.	Dayton, Ohio
10	Denver Gas & Electric Light Co.	Denver, Colo.
3	Des Moines City Railway Co.	Des Moines, Iowa
2	Duluth Street Railway Co.	Duluth, Minn.
2	Eastern Penn. Light, Heat & Power Co.	Pottsville, Pa.
2	Eastern Pennsylvania Railways Co.	Pottsville, Pa.
2	El Paso Electric Ry. Co.	El Paso, Tex.
2	Empire District Electric Co.	Joplin, Mo.
3	Fall River Electric Light Co.	Fall River, Mass.
5	Gas & Electric Improvement Co.	Boston, Mass.
31	Georgia Railway & Power Co.	Atlanta, Ga.
4	Great Northern Power Co.	Duluth, Minn.
2	Great Indian Peninsular Railway Co.	Bombay, India
13	Greenfield Electric Light & Power Co.	Greenfield, Mass.
6	Havana Electric Ry. Light & Power Co.	Havana, Cuba
3	Heemaf Bauwbureau,	Den Bosch, Holland
2	Henryetta Electric Light Co.	Henryetta, Okla.
2	Holton Power Co.	El Centro, Cal.
2	Home Gas & Electric Co.	Greeley, Colo.
3	Houston Lighting & Power Co.	Houston, Tex.
2	Idaho Light & Power Co.	Boise, Idaho
2	Kahului Railroad Co.	Kahului, Maui, T. H.
10	Kansas Gas & Electric Co.	Wichita, Kans.
5	Kansas City Power & Light Co.	Kansas City, Mo.
2	Lehigh Navigation Electric Co.	Allentown, Pa.
2	Little Rock Ry. & Electric Co.	Little Rock, Ark.
2	Lorain County Electric Co.	Elyria, Ohio
49	Los Angeles Gas & Electric Corp.	Los Angeles, Cal.
7	Los Angeles Railway Corp.	Los Angeles, Cal.
2	Malden Electric Co.	Malden, Mass.
2	Manchester Trac. Light & Power Co.	Manchester, N. H.
32	Milwaukee Electric Ry. & Light Co.	Milwaukee, Wis.
2	Minneapolis General Electric Co.	Minneapolis, Minn.
2	Montreal Tramways Co.	Montreal, Que.
12	Municipal Railway	San Francisco, Cal.
2	Nebraska Power Co.	Omaha, Neb.
3	New Bedford Gas & Edison Lgt. Co.	New Bedford, Mass.
17	New Orleans Railway & Light Co.	New Orleans, La.
11	New York State Railways	Rochester, N. Y.
2	New York & Harlem Railroad Co.	New York City
7	Northern New York Utilities, Inc.	Watertown, N. Y.
30	Northern Ohio Traction & Light Co.	Akron, Ohio

No. Trucks		
8	Northern States Power Co.	Minneapolis, Minn.
9	Northern Texas Traction Co.	Fort Worth, Tex.
9	Oklahoma Gas & Electric Co.	Oklahoma City, Okla.
2	Okmulgee Ice & Light Co.	Okmulgee, Okla.
24	Pacific Gas & Electric Co.	San Francisco, Cal.
4	Pacific Power & Light Co.	Portland, Ore.
3	Pacific Northwest Traction Co.	Everett, Wash.
3	Penn Public Service Corp.	Johnstown, Pa.
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2	Rio de Janeiro Tramway Light & Power Co.	Rio de Janeiro, Brazil
21	Rochester Gas & Electric Corp.	Rochester, N. Y.
6	Rockford & Interurban Ry. Co.	Rockford, Ill.
4	St. Lawrence Transmission Co.	Potsdam, N. Y.
12	San Diego Consol. Gas & Electric Co.	San Diego, Cal.
18	San Joaquin Light & Power Corp.	Fresno, Cal.
2	Seattle Municipal Railway	Seattle, Wash.
4	Sioux City Gas & Electric Co.	Sioux City, Iowa
2	Bert H. Shepard Co., Inc.	Syracuse, N. Y.
4	Southern California Edison Co.	Los Angeles, Cal.
5	Southern Public Utilities Co.	Charlotte, N. C.
6	Southern Sierras Power Co.	Riverside, Cal.
7	Southern Utilities Co.	Palatka, Fla.
5	Southwestern Gas & Electric Co.	Shreveport, La.
5	Steubenville, East Liverpool & Beaver Valley Traction Co.	East Liverpool, Ohio
2	Tallahassee Power Co.	Badin, N. C.
4	Toledo Railways & Light Co.	Toledo, Ohio
5	Toronto Electric Light Co., Ltd.	Toronto, Ont.
2	Torrington Electric Light Co.	Torrington, Conn.
2	Transit Development Co.	Brooklyn, N. Y.
3	Trumbull Public Service Co.	Warren, Ohio
5	Turners Falls Power & Electric Co.	Turners Falls, Mass.
4	Twin City Rapid Transit Co.	Minneapolis, Minn.
11	Union Electric Light & Power Co.	St. Louis, Mo.
25	Union Gas & Electric Co.	Cincinnati, Ohio
4	Union Street Railway Co.	New Bedford, Mass.
6	United Electric Light Co.	Springfield, Mass.
8	United Electric Railways Co.	Providence, R. I.
2	United Illuminating Co.	New Haven, Conn.
6	United Railways & Electric Co.	Baltimore, Md.
3	United Railways Co.	St. Louis, Mo.
2	Utah Power & Light Co.	Salt Lake City, Utah
3	Utica Gas & Electric Co.	Utica, N. Y.
2	Washington Water Power Co.	Spokane, Wash.
6	Washington Railway & Electric Co.	Washington, D. C.
3	Western Light & Power Co.	Boulder, Colo.
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2	Worcester Electric Light Co.	Worcester, Mass.
2	York Haven Water & Power Co.	York Haven, Pa.
2	Youngstown Municipal Railway Co.	Youngstown, Ohio
969		

THE WHITE COMPANY, *Cleveland*

White Trucks

Those who ride the Nachod way
Will live to ride another day

NACHOD SIGNALS

Will See Them Safely Home

Running in several extras on a single track, already congested with schedule cars, is something to worry about. But it often has to be done nearly every day to handle the returning picnickers, outings, circus crowds, baseball fans and others who must be taken care of outside the regular schedule.

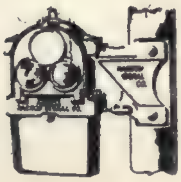
Nachod Signals lift the worries from over-worked transportation officials. They permit greatly increased use of single-track and existing turnout facilities with absolute safety. Thus they make possible increased revenues, without investment for double-tracking.

With Nachod Signals any number of cars can follow through a block, but opposing movements are prevented until the block is clear. These signals operate at high or low speeds and at any feasible trolley voltage. They give clear indications of unusual brilliancy, both discs and lights.

Send for catalog

NACHOD SIGNAL CO., Inc.
Louisville, Ky.

NACHOD SPELLS SAFETY



Try them yourself
NACHOD SIGNALS
at the
A.E.R.A. Convention
Booth No. 12 Sec. C

we will have a complete layout, set up to simulate exactly actual operating conditions. You can operate the model cars in any passing and shifting movements, and study the action of Nachod Signals.

POLES *of* Great Strength

HERE IS SHOWN Creosoted Long Leaf Yellow Pine Poles doing triple duty for the Texas Power & Light Company of Dallas, Texas. These extra strong poles are used jointly as supports for transmission, trolley and telephone lines on the Texas Electric Railroad's line between Ferris and Corsicana, Texas. The strength and durability of Creosoted Yellow Pine Poles is proved by the fact that they have been in use for more than 25 years by several Texas electric railway companies and still are in good condition.

The great natural strength of Long-Bell Creosoted Yellow Pine Poles is preserved by treating, full length, with the best grade of English Creosote Oil, by the pressure-vacuum process. This treatment enables them to resist decay, fire and other destructive elements. They are straight, trim, attractive—a real asset to any company. Economical because they give dependable service for many years. As evidence of our confidence in these poles, each is branded five feet above the ground line with the "Long-Bell" Trade-Mark.

Long-Bell Creosoted Yellow Pine Ties are especially adapted to electric railway use because of their great strength and ability to resist destructive elements. They reduce maintenance costs to a minimum. Two styles: hewed and sawed.

For further information, send for Descriptive Literature on Long-Bell Creosoted Yellow Pine Poles and Ties.

The Long-Bell Lumber Company

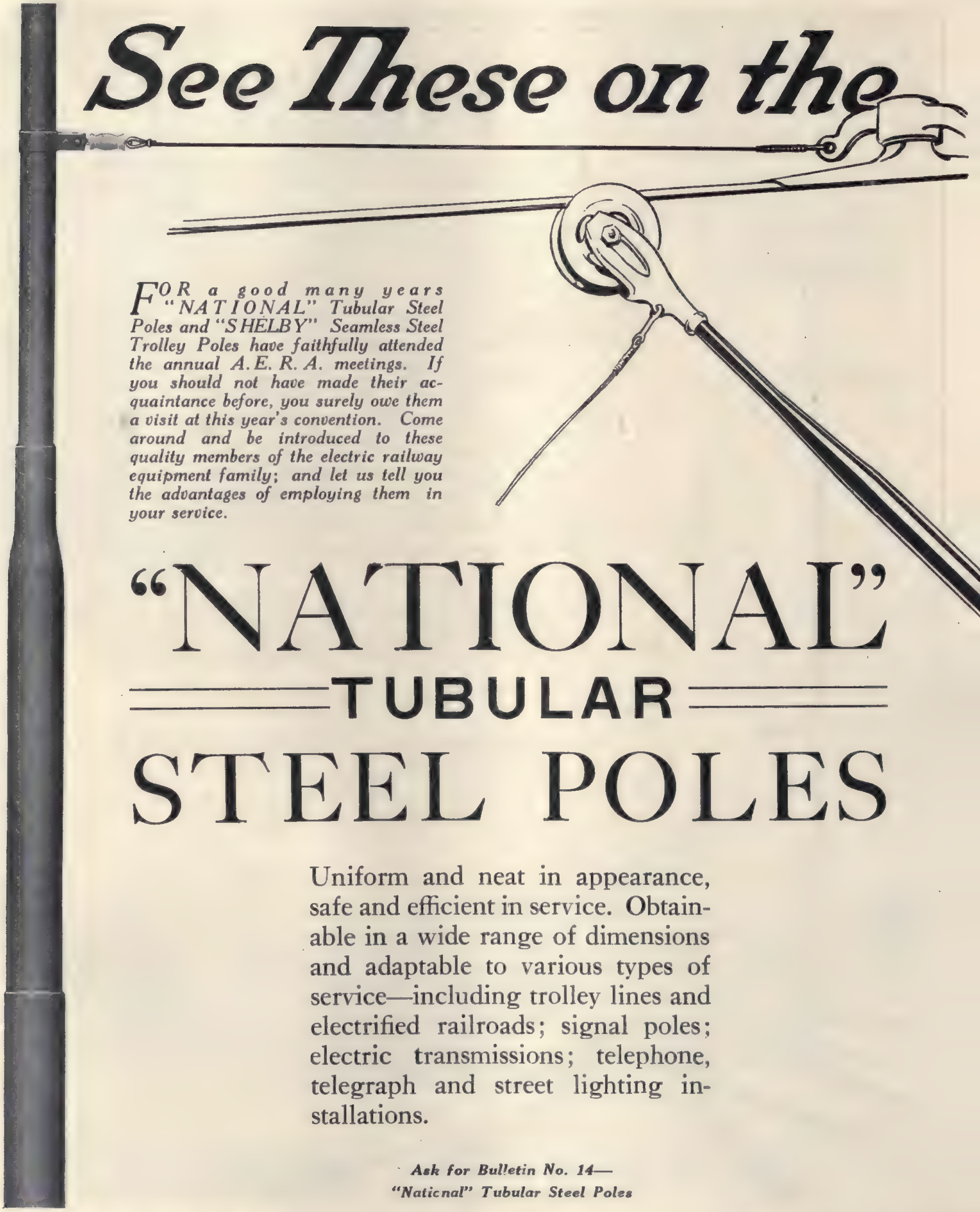
1004-B R. A. LONG BLDG. KANSAS CITY, MO.

Creosoted Yellow Pine Poles; Ties; Highway Guard Rails and Fence Posts; Timbers, Lumber, Piling and Wood Blocks.

Carloads of Long-Bell Creosoted Yellow Pine Poles and piles of Creosoted Ties at creosoting plant, ready for shipment.

LONG-BELL

See These on the



FOR a good many years "NATIONAL" Tubular Steel Poles and "SHELBY" Seamless Steel Trolley Poles have faithfully attended the annual A.E.R.A. meetings. If you should not have made their acquaintance before, you surely owe them a visit at this year's convention. Come around and be introduced to these quality members of the electric railway equipment family; and let us tell you the advantages of employing them in your service.

"NATIONAL"
TUBULAR
STEEL POLES

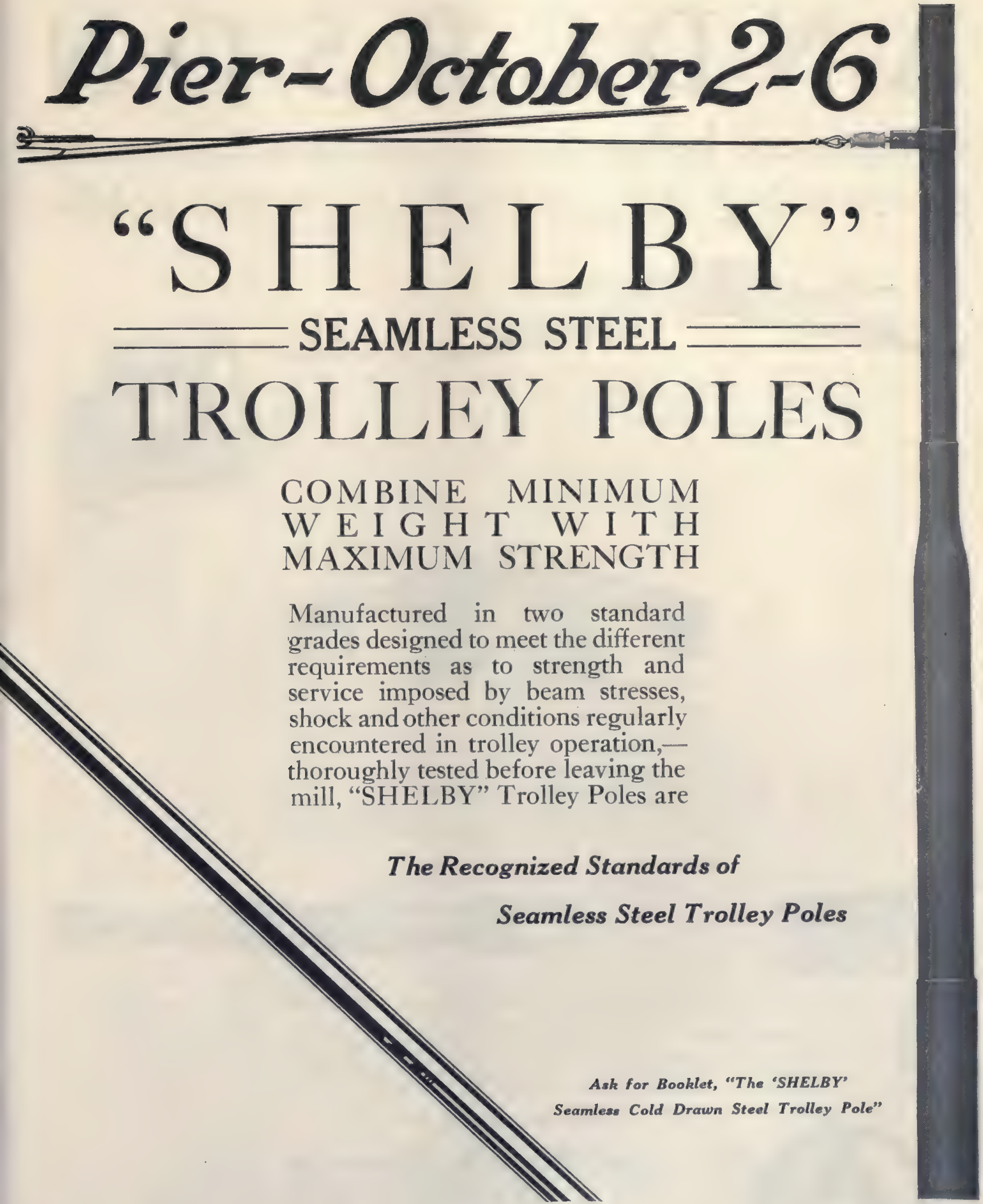
Uniform and neat in appearance, safe and efficient in service. Obtainable in a wide range of dimensions and adaptable to various types of service—including trolley lines and electrified railroads; signal poles; electric transmissions; telephone, telegraph and street lighting installations.

Ask for Bulletin No. 14—
"Naticnal" Tubular Steel Poles

NATIONAL TUBE COMPAN

DISTRICT SALES OFFICES

Atlanta
Boston
Chicago
Denver
Detroit
New Orleans
New York
Salt Lake City
Pittsburgh
Philadelphia
St. L
St. P



Pier—October 2-6

"SHELBY"

SEAMLESS STEEL

TROLLEY POLES

COMBINE MINIMUM WEIGHT WITH MAXIMUM STRENGTH

Manufactured in two standard grades designed to meet the different requirements as to strength and service imposed by beam stresses, shock and other conditions regularly encountered in trolley operation,—thoroughly tested before leaving the mill, "SHELBY" Trolley Poles are

The Recognized Standards of

Seamless Steel Trolley Poles

Ask for Booklet, "The 'SHELBY' Seamless Cold Drawn Steel Trolley Pole"

General Sales Offices
FRICK BUILDING **PITTSBURGH, PA.**

ACIFIC COAST REPRESENTATIVES: U. S. Steel Products Co., San Francisco, Los Angeles, Portland, Seattle
EXPORT REPRESENTATIVES: U. S. Steel Products Co., New York City

ANDERSON

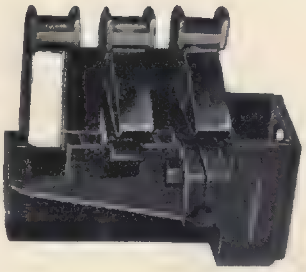
equipment helps to sell transportation by *preventing delays* that annoy the public

Anderson Crossovers prevent delays by eliminating the breaking of the trolley wire at crossover points

They insure long wear of both crossing and wires. The approach ears of bronze are pivoted to the main casting. This permits them to rise slightly with the approach of the trolley wheel, thus taking the wear off the wires at the point subject to greatest injury. This prevents crystallization and the subsequent breakage at those points.

Lindall Brush Holders prevent many delays due to motor trouble

They guarantee constant brush pressure and this assures sparkless commutation.

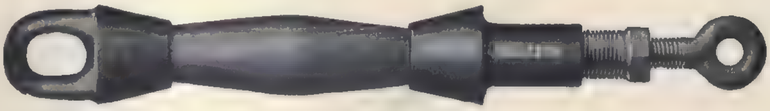


Anderson Round Top Straight Line Suspensions prevent delays due to breakage from line contractions

Their great mechanical strength prevents the annoyance due to breakage which often comes with the inevitable wire contraction in winter. Also line foremen prefer them because they prevent creepage troubles.

Anderson Canopy Switch prevents delays by quick action

And because they never stick they have replaced ordinary circuit breakers on thousands of cars.



Anderson Double Takeup Wood Strain Insulators help to prevent delays due to guy wire evils

They take up the slack in guy wires without any twisting effect. The double take-up feature cuts the adjustment time in half. And good insulation, high tensile strength and perfect adjustment assure the right operation of the guy wire which prevents delays from mal-alignment of the trolley wire.

Please call at space 47, Section F

TRADE MARK

Reg. U. S. Pat. Off.

Albert & J. M. Anderson
Mfg. Co.

Established 1877

289-293 A St., Boston, Mass.

Branches—New York, 135 B'way. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, 38-39 Upper Thames Street, E. C. 4.

TRADE MARK
AETNA
REGISTERED

ANACONDA
from mine to consumer
TRADE MARK

BOOTH 64 SECTION D

ELECTRIC COPPER EXHIBIT

Delegates to the Convention of the American Electric Railway Association should not fail to see and study the joint exhibit of the Anaconda Copper Mining Company and The American Brass Company.

The exhibit displays trolley wire of various compositions for varying conditions of use, as well as commutator copper, bus bars, weatherproof wire, slow burning wire, magnet wire.

The Trade Mark "Anaconda" identifies copper and brass products of the highest technical skill in manufacture.

Anaconda Wire and other products used in the electric railway industry are shipped from the following points:

Great Falls, Montana
Kenosha, Wisconsin
Ansonia, Conn.
Waterbury, Conn.

ANACONDA COPPER MINING CO.
Rolling Mills Department
111 W. WASHINGTON ST., CHICAGO

THE AMERICAN BRASS COMPANY
General Offices
WATERBURY, CONN.

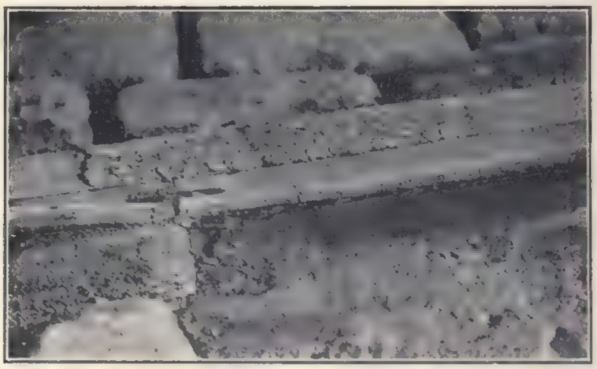
ANACONDA

Renewal Cost Post

Track welding with

Ajax Electric Arc Welder

The AJAX does a job like this—smooth, uniform and deeply penetrating.



Especially for Railway Work

No longer is it necessary to run cars over rough and rickety track, until it will no longer carry them—then renew it. Progressive companies, today, keep track in tip-top shape, at trifling cost, by welding and grinding. The useful life of rails is greatly prolonged.

Ajax Electric Arc Welder is an equipment especially adapted for electric railway work. It is the highest capacity machine on the market—output 333 amperes at 600 volts—maintains high amperage even on very poor voltage. Weighs only 155 lbs.—two men can carry it, load it on car platform, and handle it with the utmost ease.

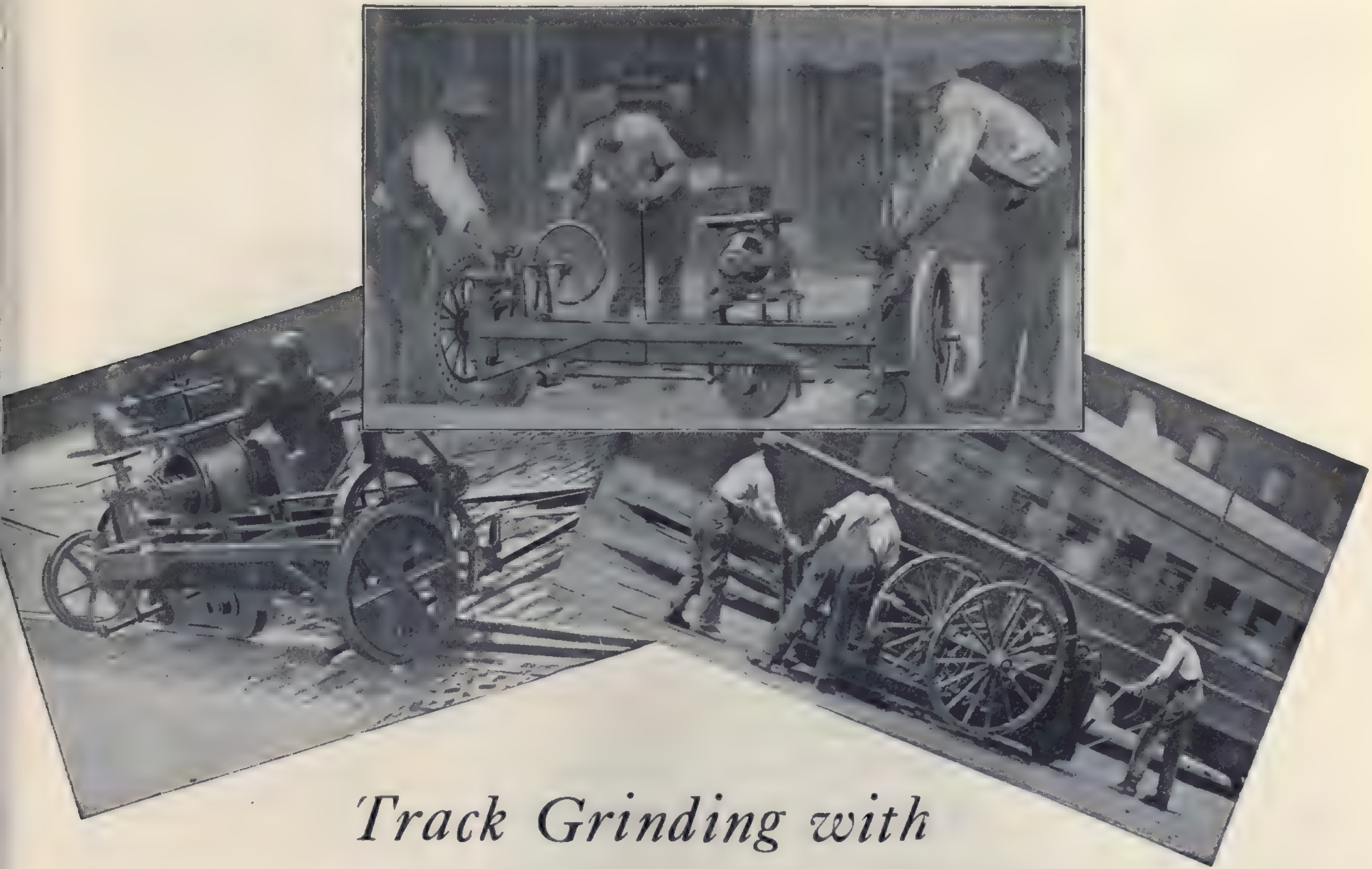
Send for full details.

Rehabilitate your track

RAILWAY TRACK-

3132-48 East Thompson St.,

poned for Years



Track Grinding with

Atlas Universal Reciprocating

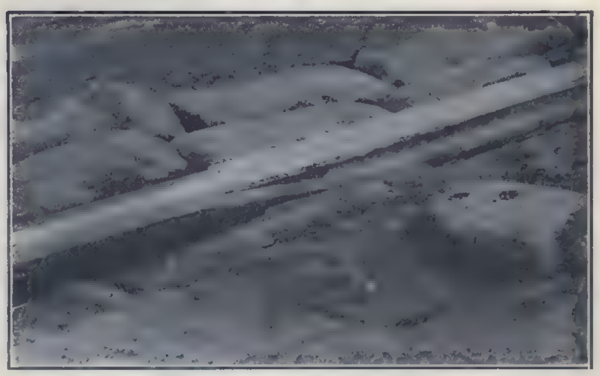
Rail Grinding Machines

Nearly 500 companies, including practically half the operating companies in the United States, use one or more of these efficient, track salvaging machines. The very smallest company needs and can afford at least one Atlas or Universal Rail Grinder for following up welding operations and a Reciprocating Track Grinder for removing corrugations. Some companies have a score or more of these machines.

Track which a year or two ago looked hopeless, has been restored to first-class running condition, and is good for several years to come. The cost of welding and grinding is negligible compared with the savings.

Let our experts demonstrate to you, what can be done.

After Welding—smoothed to an even running surface with a Universal or Atlas Grinder.



by welding and grinding

WORK COMPANY

Philadelphia, Pa.

ST. LOUIS FROG & SWITCH CO.

St. Louis, Mo.

Manufacturers of up-to-date

ST. LOUIS FROG & SWITCH CO. ST LOUIS, MO.

Special Track Work,

Railroad Crossings

Frogs and Switches

for

STEAM and ELECTRIC RAILWAYS

Complete Catalogue of Rail Built and Manganese Track Structures with Information of Value to Maintenance Engineers will be sent on request.

Superior Switches, Mates, Frogs
and Crossings

Curves, Turnouts, Cross Connections and
Kerwin Portable Crossovers

Estimates Promptly Furnished

Write for Catalog

BARBOUR, STOCKWELL CO.

Established 1858

205 Broadway, Cambridge, Mass.

1859

WHARTON QUALITY MANGANESE
IS ULTIMATELY

All Special Trackwork Layouts Are Assembled and Carefully Checked
In Our Yard Before Shipment

WM. WHARTON,
EASTON,

SALES OFFICES:

Boston, Mass.	Denver, Col.	Philadelphia, Pa.	San Francisco, Calif.
Chicago, Ill.	New York City	Pittsburgh, Pa.	Scranton, Pa.

1922

STEEL SPECIAL TRACKWORK THE CHEAPEST

Stack of Wharton Solid Manganese Steel Girder Rail Switches in Storeyard of One of the Largest Street Railways in the Central West

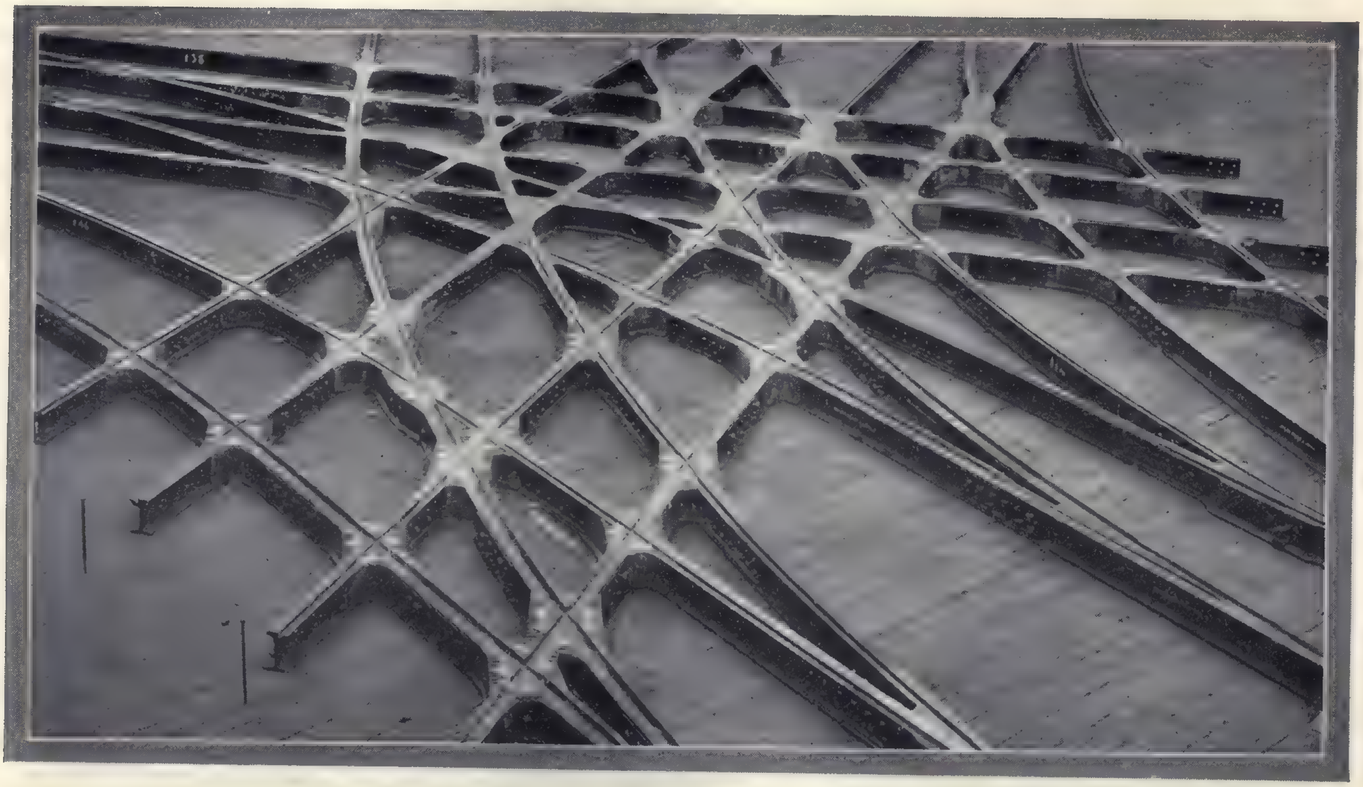
JR. & CO., INC.

PENNA.

Other Plants:

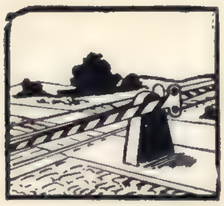
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

PHILADELPHIA ROLL & MACHINE CO., Philadelphia TIOGA STEEL & IRON CO., Philadelphia



Lincoln, Ashland & Belmont Aves., Chicago. Installed March, 1915.

Buda Trackwork and Equipment

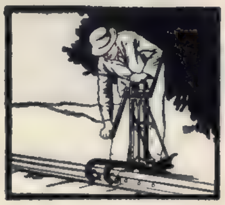


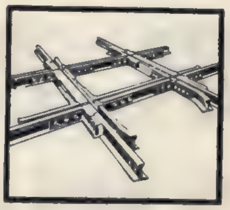
The superiority of Buda trackwork is being borne out daily on the streets of hundreds of American cities. There are many examples here in Chicago under exceptionally heavy traffic conditions.

At Clark and Randolph Streets, in the center of the loop is a layout installed in March, 1918. Judge for yourself its present condition under such extremely heavy service. We can show you many similar Buda installations here.

Buda special trackwork includes the most advanced design of modern types, and the Buda name is an assurance of the highest quality throughout.

THE BUDA COMPANY, Harvey, Illinois



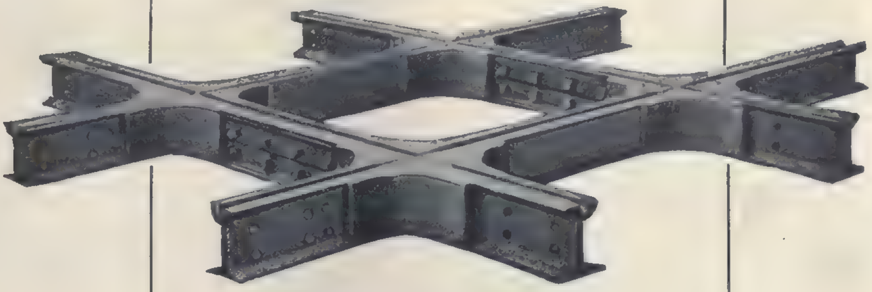


BUDA

ESTABLISHED

1881

Switches
Mates
Frogs
Crossings
Complete Layouts



Crossings of every description

Solid Manganese—Insert
Iron Bound and Built Up

Improved Anti-Straddle Tongue Switch

Eliminates Derailments and Delays

LOCKED securely in either position—the car cannot split the switch. This is the only Pinless Tongue Switch on the market—perfect fit—100% bearing efficiency. No complicated mechanism — maintenance negligible.

In our standard Iron Bound Frog and Crossing Construction we furnish Special High Carbon Hammered Steel or Manganese Centers at your option. The centers are securely set on a firm bearing—and are put there to stay.

New York Switch & Crossing Co.
HOBOKEN, N. J.

The ERICO Series Type Arc Welding
and Bonding Rheostat

for arc weld repairing as well as rail bonding

The ERICO Series Type Arc Welding and Bonding Outfits have a dual utility. Compact, light, but exceptionally rugged, they are without a peer for rail bonding.

In the shop the heavy indestructible resistance coil furnishes current for continuous welding and cutting without injury or wear.

The pure mica insulation prevents "short circuits" due to moisture, and even the highest heat does not destroy or impair its insulating capacity. Unlike porcelain and similar products, our mica will withstand unlimited handling.

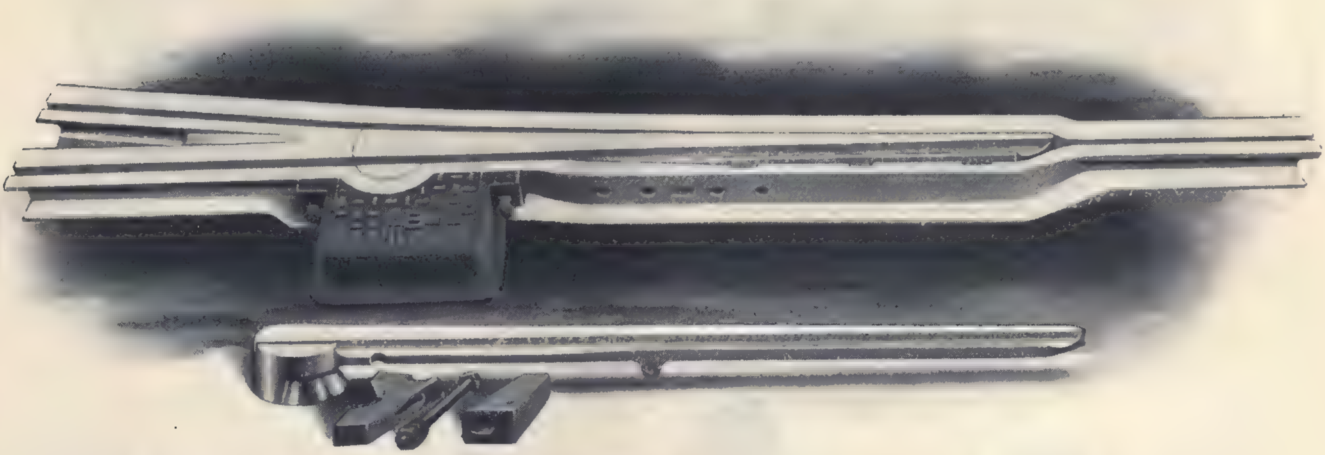
Weld your broken out keyways, build up your wheel flanges, repair your broken frames with the ERICO Series Outfit. The saving is worth while.

See our demonstration of the Series Type Outfit at the Convention.

The Electric Railway Improvement Co.
Cleveland, Ohio

Series Type Welding Outfit

BETHLEHEM
SPECIAL TRACK WORK



Bethlehem Solid Manganese Tongue Switch

Long wearing qualities—simplicity of design—easy adjustment—quick cleaning—these features, coupled with the large diameter deep socket pin at heel of tongue, and heavy re-inforcement at the toe insure lasting service.

The large bearing area of the bottom of pin resists the tendency to "kick up" at toe, the deep socket resists a tendency to rock or roll over due to the side thrust action of wheel flange, and the lateral re-inforcement prevents bending of the point.

Special attention is called to the adjusting and hold-down device. As shown in the illustration, this consists of a keeper block, a bolt, and a wedge. The block fits the cone-shaped surface of the "Big Pin," and as the bolt is tightened the wedge action forces the tongue back, maintaining a tight joint at the heel and at the same time firmly holding the tongue down.

Specify Bethlehem Solid Manganese Tongue Switch, Design 905.

Bethlehem Hard Center Frog

IRON BOUND TYPE

This frog—our Design No. 942—is built up of rolled steel rails cast into a semi-steel body, and fitted with a heavy manganese steel wearing plate 3 in. thick.

The wearing plate is ground top and bottom and rests solidly on the carefully machined bed of the frog body. It is held firmly to its bearings by extra heavy stud bolts of heat-treated Mayari chrome nickel steel. The nuts are spelter-sealed to exclude moisture and to positively lock them in position.

The entire construction is unusually heavy and substantial and combines the advantages of a wearing plate of manganese steel and rolled rail arms, to which standard rolled or welded joints may be applied.

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

Sales Offices:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh Cleveland Detroit Chicago St. Louis San Francisco

SOLE EXPORTER OF OUR COMMERCIAL PRODUCTS CONSTECO CONSOLIDATED STEEL CORPORATION 25 BROADWAY, NEW YORK, U.S.A.

Over Seventy Traction Lines

Typical Scenes on Various Railways

Ingerso

Use Ingersoll-Rand Track Tools

Cutting out concrete with Paving Breakers operated from Tamper Compressor. The Imperial Tie Tamper itself is sometimes used with a pointed tool for this work.

"IMPERIAL" TIE TAMPERS

For Big Savings in Track Cost

Economies in maintenance and construction of tracks are available for the smaller roads as well as the big ones.

Imperial Tie Tampers cut the labor gang—six or seven men can do the work of fifteen with hand tools. The entire line—paving breakers, rail drills, rail grinders, screw spike drivers—all contribute to lower costs on track work.

Inspect the Ingersoll-Rand Exhibit at the Convention

Space 72, Section B

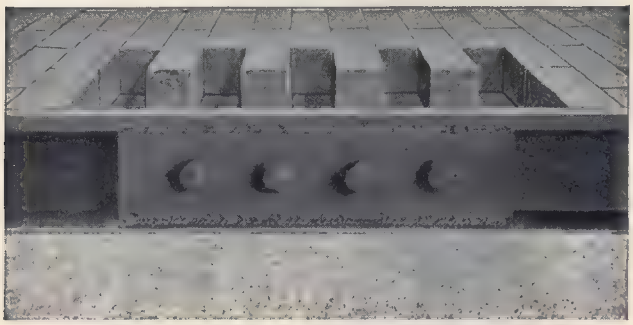
Ingersoll-Rand Company
***General Offices:* 11 Broadway, New York**
Offices Everywhere

ll-Rand

A Good Joint
Adds Years of Life to Your Rail

RWB Carbon Arc Welded Joints have reclaimed many hundreds of miles of old track. The saving in time and money in this manner has lead one prominent maintenance-of-way engineer to state that he considered this process one of the greatest contributions in solving the problem of track maintenance.

It is a well-known and accepted fact that rail joints determine to a large extent the life of a track. It is, therefore, exceedingly important to guard against the deterioration of the joints in order to preserve the rails and give the entire track long life, with a minimum amount of maintenance.



Carbon Arc Welded Rail Joint—Tee Rail

Carbon Arc Welded Rail Joint—Groove Rail

Welding R W B Joints Under Traffic

The RWB Carbon Arc Welded joint meets these requirements in an admirable way and in addition costs less than any other type of joint used in paved right-of-ways.

The same RWB Dynamotor which supplies the Carbon Arc Welding current for installing the joints is also a metallic arc welding unit. This provides for building up worn and cupped rails, and repairing manganese special work so that complete rehabilitation of old track can be accomplished.

Full description of the Carbon Arc Process of welding joints and how the Type WW Dynamotor is used not only for track work but for shop welding is given in a recent catalogue. It is yours upon request.

Visit our Booths No. 51 and 52
at the Chicago Convention.

Rail Welding & Bonding Company
Cleveland, Ohio

A Good Bond
By a Direct Weld of Copper to Rail

Electrical requirements have made copper the almost universal bond material. To weld this copper bond direct to the rail quickly and positively was made possible by the RWB Carbon Arc Process.

The arc really never touches the rail but is merely the source of heat that melts the original bond terminal into the weld itself and the weld seals it to the rail.

A special Alloy Filler Wire is used to produce bond heads, practically free from porosity and to increase the strength of the contact between the copper and steel.

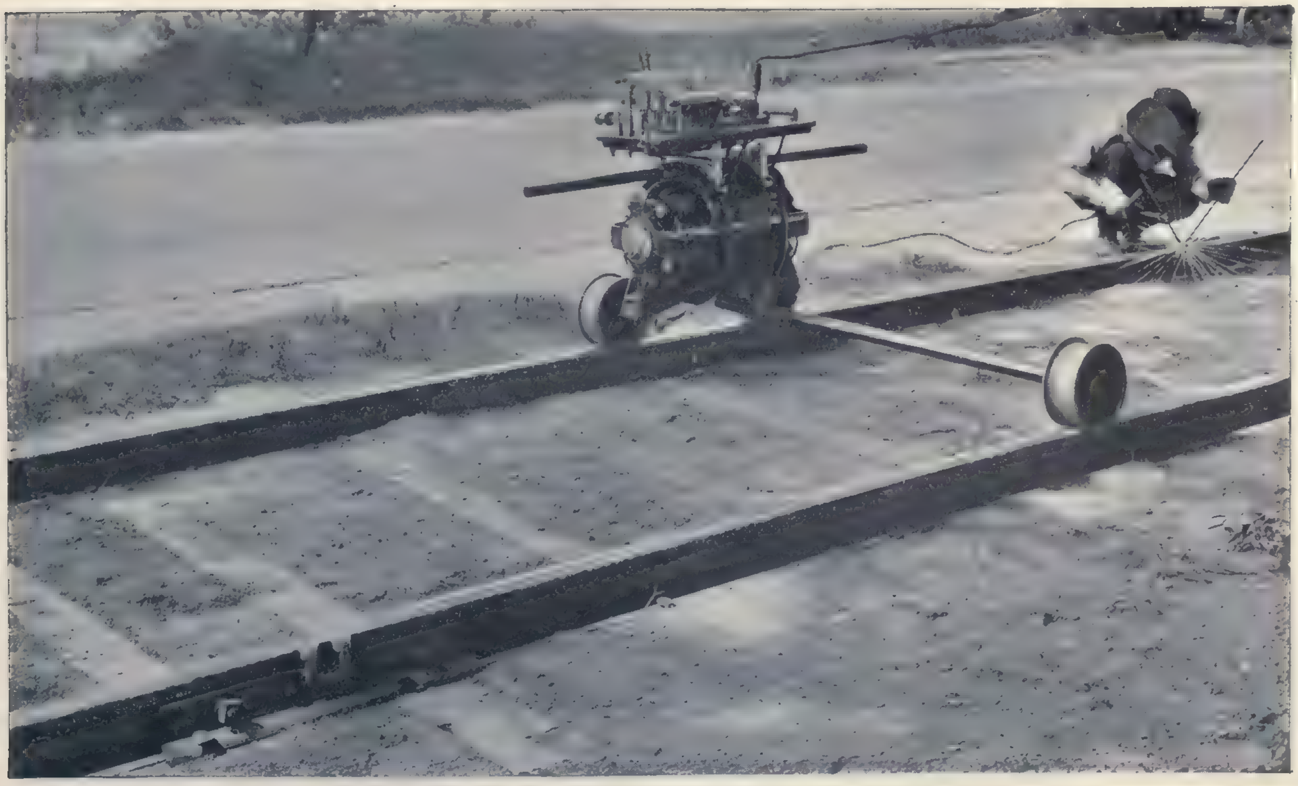
From 25,000 to 32,000 pounds per square inch is necessary to shear the bond from the rail. This assures long life against the wear and tear of traffic conditions.

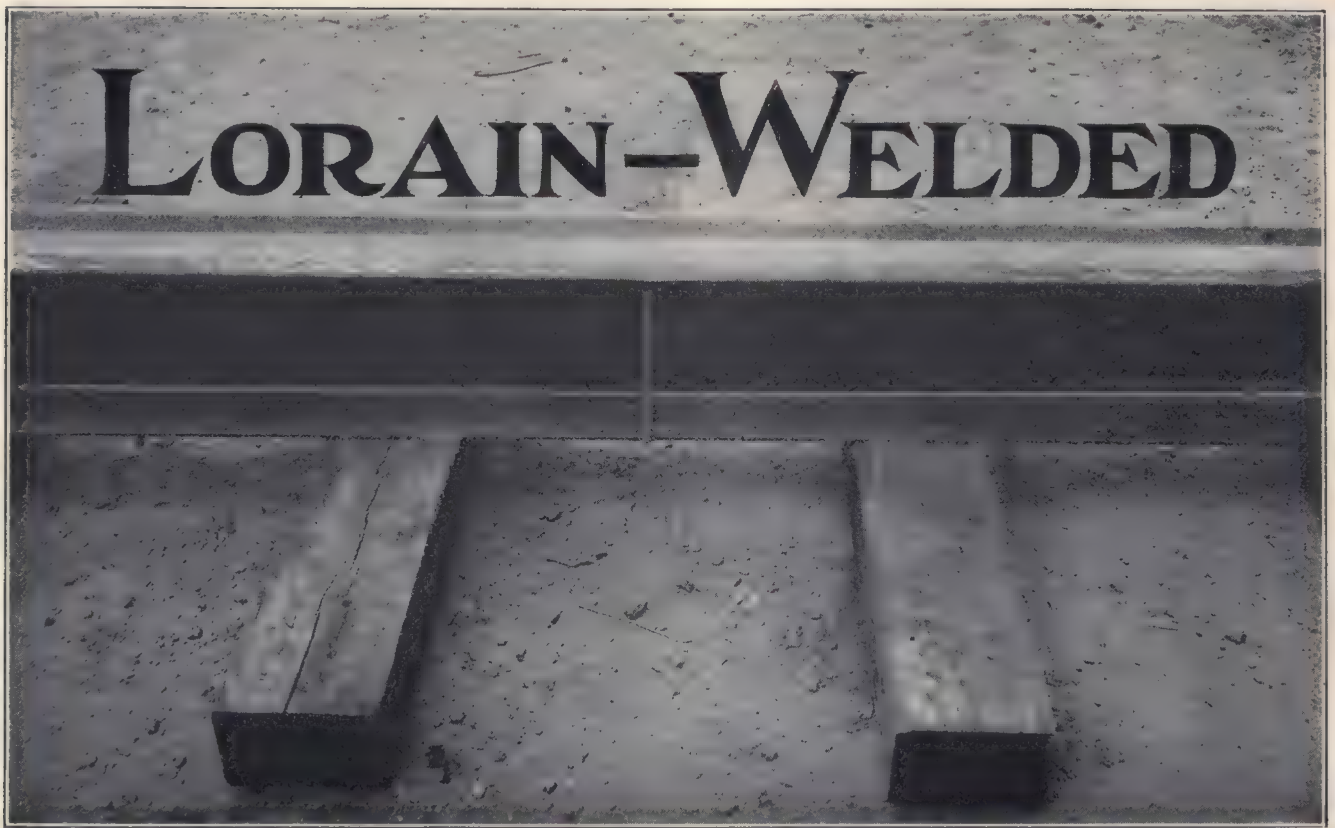
The electrical conductivity of RWB Bonds is very high as the path of the current is copper from rail to rail. The bond head itself has less than 5% of the whole bond resistance.

The RWB line of bonds is complete. This includes both the cable and laminated types as requirements may demand. They can be supplied in any standard carrying capacities.

This latest bond development will be demonstrated at our booths No. 51 and 52 at the Chicago Convention. Send for Bulletin No. 102 RWB UNA Bonds, and Bulletin No. 101, which tells how a Type BB Dynamotor can save money for you the year around.

Rail Welding & Bonding Company
Cleveland, Ohio





The two **LORAIN PROCESSES**
of electrically welding joints
(butt weld and bar weld)
are the only processes that forge the steel while the weld is being made

A durable, lasting weld cannot be made unless steel is forged while hot

The Lorain Steel Company
General Offices: Johnstown, Pennsylvania

Sales Offices:
Atlanta
Chicago
Cleveland
New York
Philadelphia
Pittsburgh
Los Angeles
Portland
San Francisco
Seattle

STEEL and concrete, the approved materials for all foundations, are adapted most efficiently to track construction in a proved and popular combination known as STEEL TWIN TIE TRACK.

The facts and figures are conveniently accessible---Stop at our Exhibit Spaces 13 and 14, Section D, or if you are not attending the Convention write for them.

The International Steel Tie Co.
Cleveland

A National Product

79% of the electric railway mileage of the United States is in 20 states. (Electric Railway Journal.)

STEEL TWIN TIE TRACK was laid in all of them in 1922.

Ask our users---List furnished on request.

**The International Steel Tie Co.
Cleveland**

AT THE CONVENTION---Spaces 13 and 14, Section D.

UNIFORM WIRE

Uniform Electrical Properties
Uniform Physical Properties

PAGE-ARMCO WELDING WIRE

The chemical elements and physical properties of welding rods and electrodes constitute one very important factor in determining the value of the finished weld.

The fact that PAGE-ARMCO WELDING RODS AND ELECTRODES are made from a sound ingot (99.84% pure iron) is convincing proof that the possibility of introducing undesirable elements, gas-pockets, slag and brittleness, is reduced to a minimum. Armco metallurgical experts test Armco Ingots for the presence of nine elements, which indicates the great care and exactness behind Page-Armco Welding Products.

Page-Armco welding rods and electrodes meet all requirements of the American Welding Society's specifications.
Gas Welding Rods G-No. 1-A.
Electrodes E-No. 1-A.

PAGE HIGH CARBON WELDING RODS AND ELECTRODES

Page Medium Carbon

For general building up operations such as Wheel Flanges, etc.

Green Tag denotes Page Medium Carbon

Page High Carbon

For welding high carbon steel and worn surfaces where great resistance to abrasive wear is desired and where machining is not necessary, such as Rails, Frogs, Switch Points, Rolls, Dredge and Shovel Points, etc.

Red Tag denotes Page High Carbon

Conforms in all respects to American Welding Society Specifications.

Grade E-No. 1-C

Packing sizes and lengths same as shown for Page Armco.

Page Manganese Steel Welding Rods and Electrodes

In Accordance with American Welding Society Folio Bulletin No. 2.
For Welding Manganese Crossing Centers, Frogs, etc.
Stock Sizes—3/16 in. Dia. Straightened and Cut in Lengths of 14 in and over.

PAGE-ARMCO STRAND WIRE

Page-Armco Strand is produced from Armco Ingot Iron (99.84% pure) free from segregations which would tend to invite corrosion.

The extra galvanized coating on Page-Armco Strand combined with the purity of the wire insures maximum service.

Page-Armco Iron Strand is used as messenger strand, guy wire or strand, telephone wire or strand, trolley span wire, ground wire or strand, telegraph wire, and as power transmission conductors.

PAGE-ARMCO GALVANIZED LINE WIRE

excels any other ferrous wire in electrical conductivity and strength as it is the purest iron wire made commercially.

Corrosion is the controlling factor in the life of line wire. Page-Armco Line Wire resists corrosion more than any steel wire when exposed to salt air or the corroding fumes of railroad terminals, manufacturing districts, etc., thereby reducing maintenance costs.

These facts should be borne in mind when considering your line wire requirements.

Page Steel and Wire Company
Bridgeport, Conn.
District Sales Offices
CHICAGO NEW YORK PITTSBURGH
PORTLAND, ORE. SAN FRANCISCO

RAMAPO IRON WORKS
Established 1881

AJAX FORGE COMPANY
Established 1883

Announcement

RAMAPO AJAX CORPORATION

is a consolidation of Ramapo Iron Works and Ajax Forge Company operating under the same sales and executive managements as heretofore, with general offices at the Hillburn Works, near New York City.

The five works of this organization are located as follows:

HILLBURN, NEW YORK
CHICAGO, ILLINOIS
NIAGARA FALLS, N. Y.
SUPERIOR, WISCONSIN

NIAGARA FALLS, ONT.
a subsidiary Canadian plant, operated under the name of Canadian Ramapo Iron Works, Limited.

RAMAPO AUTOMATIC RETURN SWITCH STANDS
RAMAPO AUTOMATIC SAFETY SWITCH STANDS

and other specialties developed by these companies, as guard rail clamps, double shoulder, solid bottom switch riser plates, etc., may be obtained through the works at any of the above five locations as well as standard switch, frog and crossing work in open hearth steel, cast manganese and rolled manganese rail construction.

Our policy shall be to cooperate with our customers in the improvement of the design and construction of our products for safety and economy in railroad operation and not only to maintain, but to improve, if possible, the reputation so long established by the Ramapo and Ajax companies under their individual names.

RAMAPO AJAX CORPORATION, HILLBURN, NEW YORK

2503 Blue Island Ave.
CHICAGO

30 Church Street
NEW YORK

McCormick Building
CHICAGO

NIAGARA FALLS, N. Y.
SUPERIOR, WIS.

Canadian Ramapo Iron Works, Limited, Niagara Falls, Ont.

Resiliency

The application of the right principle to permanent track construction

Cushion the Shock and Save Rolling Stock and Track Foundation—How it is done in Modern Track Construction

Dayton Resilient Ties apply that century old principle of shock absorption for dissipating the terrific hammer blows of traffic to track—the blows which in time are sufficient to pulverize the concrete in which the track is embedded, causing low joints and track failure and in turn racking rolling stock to pieces.

With Dayton Resilient Ties, no shocks or vibration reach the concrete foundation to cause disintegration and the resultant heaving and settling of joints. Nor are these hammer blows transmitted to rolling stock and equipment.

The slight amount of noise from traffic is evidence itself that the hammer blows are being absorbed.

DAYTON
RESILIENT TIE

Laying Resilient Tracks, in Trenton, N. J. on the Trenton and Mercer County Ry.

DAYTON

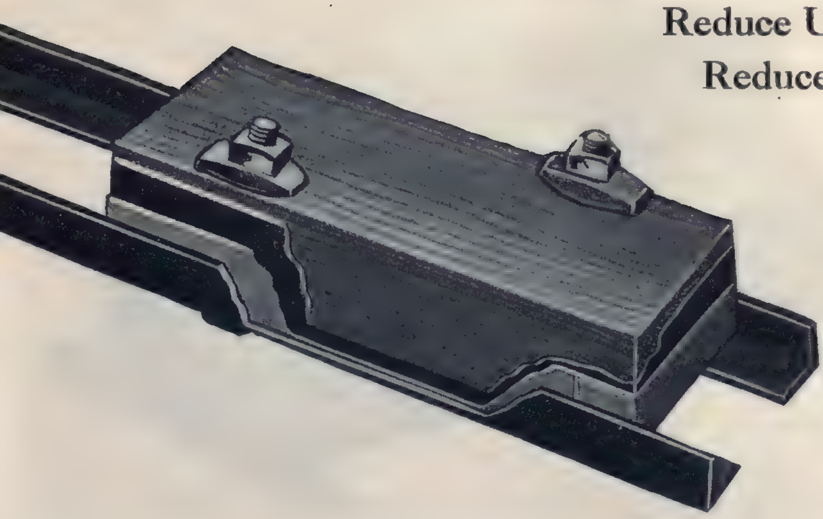
Reduce the FIRST COST. Save $6,000 per mile of track over wood ties laid in concrete

In addition to the all important saving in repairs, on both track and pavement,—in addition to insuring longer life of the rolling stock and less noise in operation—the *first cost* of Dayton Resilient ties is $6000 per mile *less* than track laid on wood ties in concrete foundation and $2000 per mile less than track laid on wood ties in gravel ballast.

Is it any wonder that more and more railway men are turning each year to the permanent low cost construction and maintenance made possible by Resilient ties.

Years of service have proven that Dayton Resilient Ties are built on sound principles and are fundamentally and practically correct. Have all the facts laid before you—write today.

Dayton Resilient Ties
Reduce First Cost
Give Longer Track and Paving Life
Reduce Track and Paving Repairs
Reduce Upkeep on Rolling Stock
Reduce Traffic Noise.



Resilient TIE

THE DAYTON
MECHANICAL TIE CO.
707 Commercial Building, Dayton, Ohio
Canadian Representative
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Add many more years of life to your track and eliminate further track and paving repairs

ARE your rail joints low—their founadtion rapidly crumbling away—the paving all caved in—your rolling stock being rapidly knocked to pieces by giant hammer blows?

Are you tearing up the pavement about every six months—using shim after shim giving only temporary repairs?

Are you just about satisfied that you'll soon have to lay some new track?

If so, you will be glad to know that—

Dayton Resilient Joint Boosters are permanent, economical and easy to install. No more labor, time or space is required than on the ordinary makeshift repair and they last fifteen times longer.

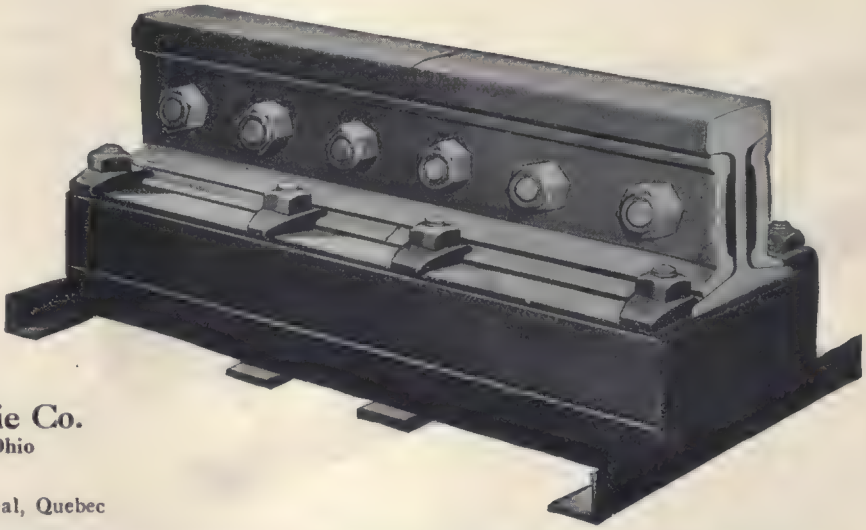
Satisfy Yourself

Railways all over the country are giving their old track a new lease on life by using the Booster. Let us tell you about a few of them and show you facts and figures proving their great saving.

Permanent—Economical Easy to Install

By far the biggest part of the cost in repairing a rail joint is the tearing away or opening up and relaying of the pavement, labor alone costing practically 90% of the whole.

Why repeat such an expensive operation every six or eight months? Why not do it right the first time, make the repair last several years, and save all that heavy labor expense and by welding the rail to the Booster insure a perfect track return.



The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

DAYTON Resilient JOINT BOOSTER

HUBBARD POLE LINE HARDWARE

and

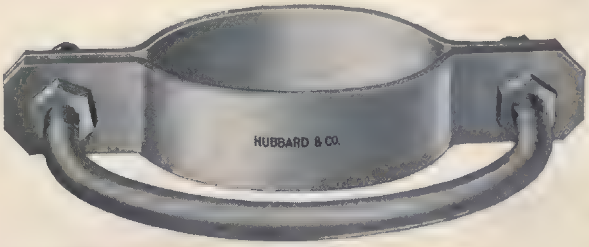
PEIRCE CONSTRUCTION SPECIALTIES

on Exhibition

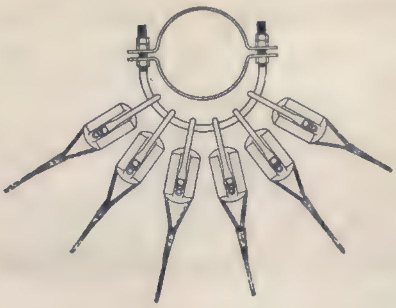
Space B-15 and 16

While at the Convention stop at our Booth and let us show you the recent additions to our line.

The Hubbard Insulated Pole Band.



The Hubbard Pole Band with Pull-Off Rod.



The above sketch shows how the Hubbard Pole Band with Pull-Off Rod eliminates the necessity for using an individual band for each guy.

HUBBARD & COMPANY
Pittsburgh, Pa.

WHEN YOU SPECIFY LUMBER FOR

CROSSARMS, TIES,

FENCING, TRUNKING AND CAPPING or any of the hundred and one things that a railway uses lumber for, just bear this important fact in mind:

The cost of the material is generally a small item as compared with the cost of labor for installing it.

When you specify and use ALL-HEART

CYPRESS

"THE WOOD ETERNAL"

for such purposes you know that it is going to give service for a long time, and that you are *not* going to be up against a continuous big *labor cost* for renewals and replacements.

Of course even Cypress may eventually have to be replaced. Nothing lasts quite forever. But in the long service life you get from Cypress you will have *saved* a lot of labor costs in *maintenance alone*.

Anyway, that's why a number of the biggest railways in the country *insist* on ALL-HEART CYPRESS.

"BUY BY THE CYPRESS ARROW."
LOOK FOR THIS MARK ON THE END OF
EVERY BOARD—AND ON EVERY BUNDLE

Our data is at your service.

SOUTHERN CYPRESS MFR'S ASS'N.

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1265 Graham Building, Jacksonville, Fla.

11 Years Practical Test
Indianapolis Welded Joints

Meet all requirements they are different from any other type of Welded Joint

Indianapolis Joints Require

- **No Bolts**
- **No Bonds**
- **No Base Plates**
- **No Maintenance**

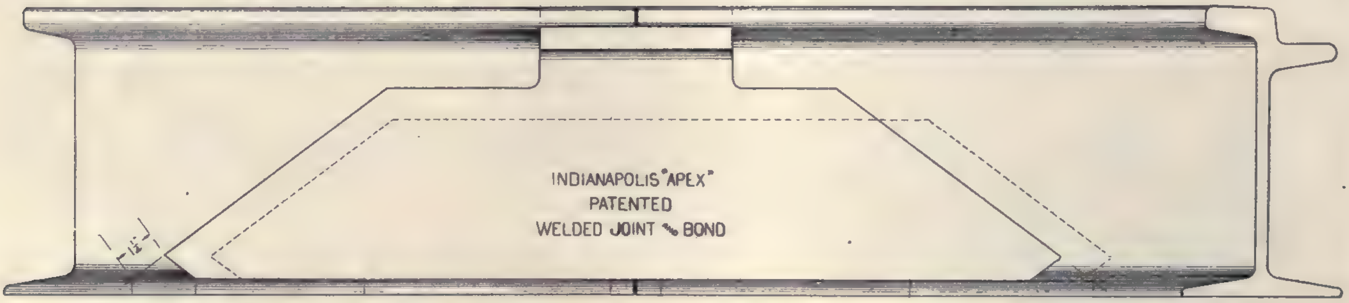
These Joints have reclaimed thousands of miles of track—

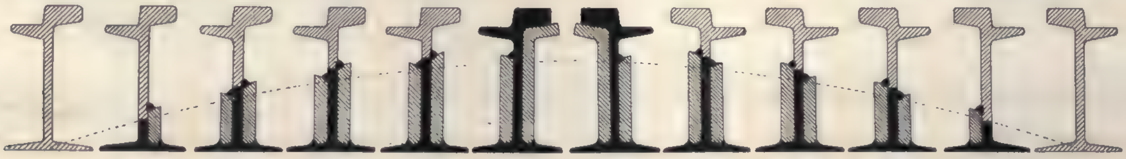
Ask Us

at Space E-63
Municipal Pier

Engineers Endorse the Principle

PERFECTION IN PRINCIPLE **PROVEN IN PERFORMANCE**





The Principle of the "Indianapolis" Joint, Illuminated in BLACK.

Note the contributed accumulative stabilizing of the rail, section in GRADUATED PROGRESSION toward the APEX, culminating in Maximum **Strength** and **Rigidity**, yet maintaining uniform **Elasticity** throughout. Theoretically, this is an enlarged section, interposed, within and equalized with the normal rail structure.

Universal—Have been installed on over 125 different rail sections

Indianapolis Welded Joints

Effect Perfect- Joining and Bonding of A ll Street Railway Rails.

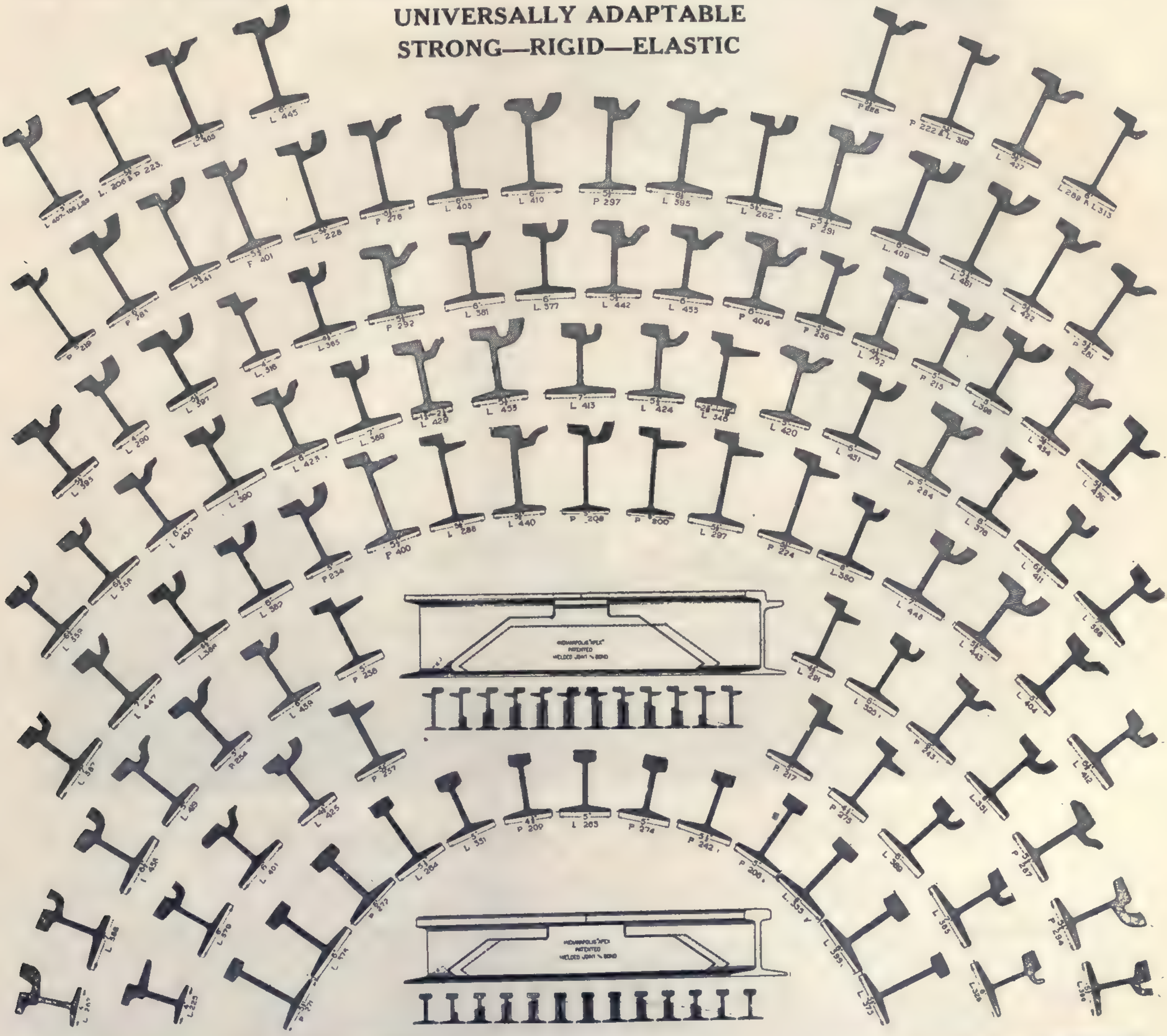
See Below—

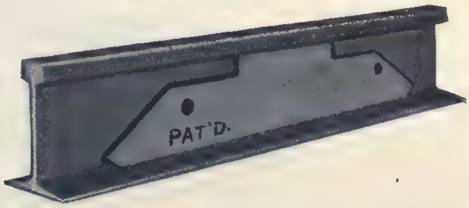
See them at Space E-63, Municipal Pier, Chicago Oct. 2 to 6.

Proven THOROUGHLY DEPENDABLE for
SUPER EFFICIENCY, and MAXIMUM ECONOMY
Thru Ten (10) Years' TIME AND USAGE TEST

On Over 125 Different Rail Sections On Over 200 Properties In 48 States and Countries

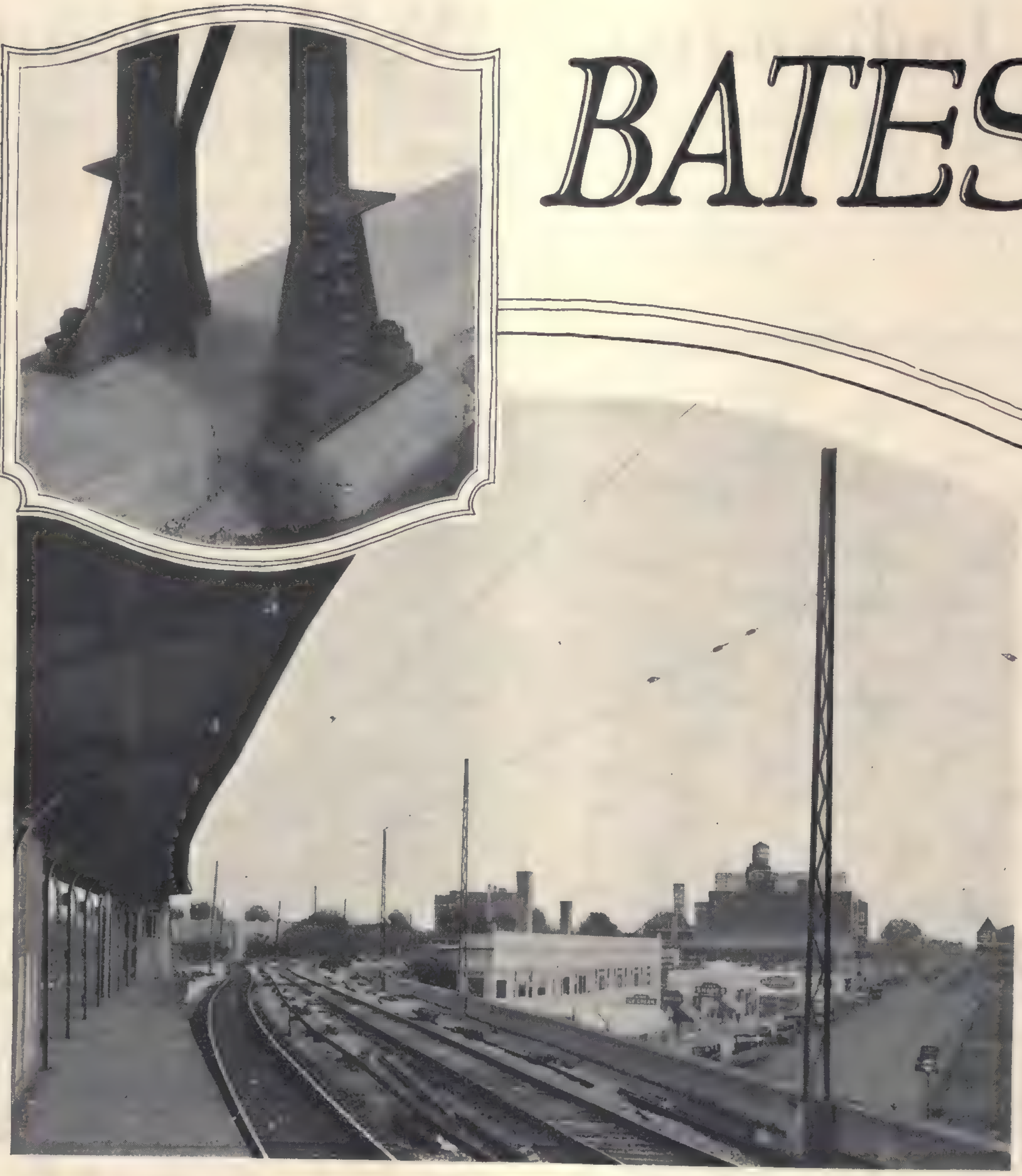
UNIVERSALLY ADAPTABLE
STRONG—RIGID—ELASTIC





Indianapolis Switch and Frog Company
Springfield, Ohio

BATES



An "On the Job" Convention Exhibit—

Every convention visitor interested in up-to-date line construction can see Bates Steel Poles in use by taking a short ride on the Northwestern Elevated, Evanston extension.

The finishing touches are now being put on this construction and a large part of the permanent overhead is up. There will be four tracks on the extension from Wilson Avenue north, three of these with a third rail and the west track with overhead on Bates Poles. This west track is used as an industry track with service to a number of coal yards and warehouses along the north shore. Switching is done at night with electric locomotives.

During the elevation work, which is now nearly complete, the entire line was operated with overhead on wooden poles. Third rail has been laid on the three east tracks and the wooden poles are being removed. The Bates Poles shown here temporarily carry overhead for four tracks, but will be used for overhead on the west track only when work is completed. The guy wires shown will be removed when the four track overhead is taken down.

Bates Expanded Steel Truss Co.

208 So. La Salle St., Chicago, U.S.A.

STEEL POLES

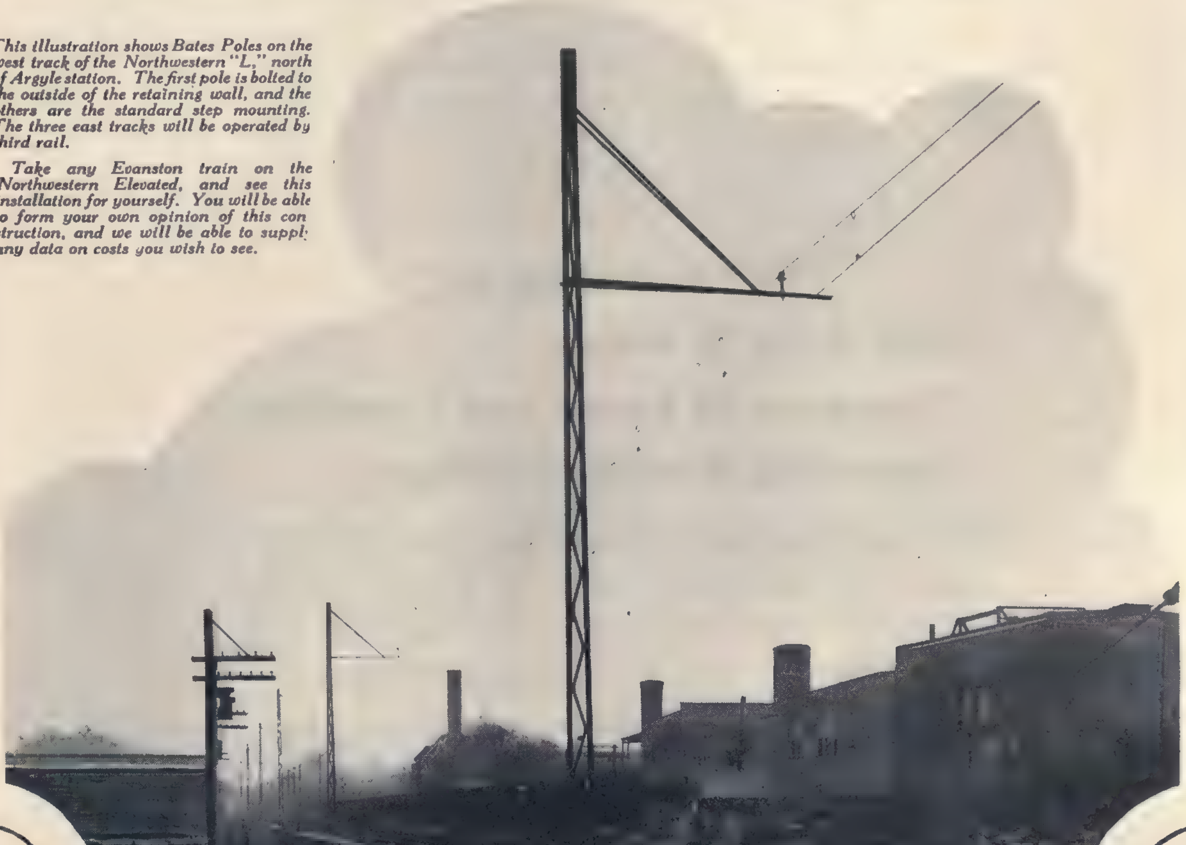
Bates Poles again used on the Northwestern "L"

Bates Steel Poles were first used by this road on its connection with the C. M. & St. P. at Buena Station. The special overhead required for handling freight up the incline to the elevated structure was easily placed on Bates Poles, and has proved very satisfactory.

While the main line will be operated by third rail, the service of a number of switch and industry tracks requires overhead trolleys for safety and convenience of locomotive operation. The Bates Pole line for this one track is placed on the top of the retaining wall, and extends into the yards and sidings on similar construction.

This installation is more economical and stronger than any other type available. The erection of these Bates Poles has been easy, and the construction is more permanent than with any other poles.

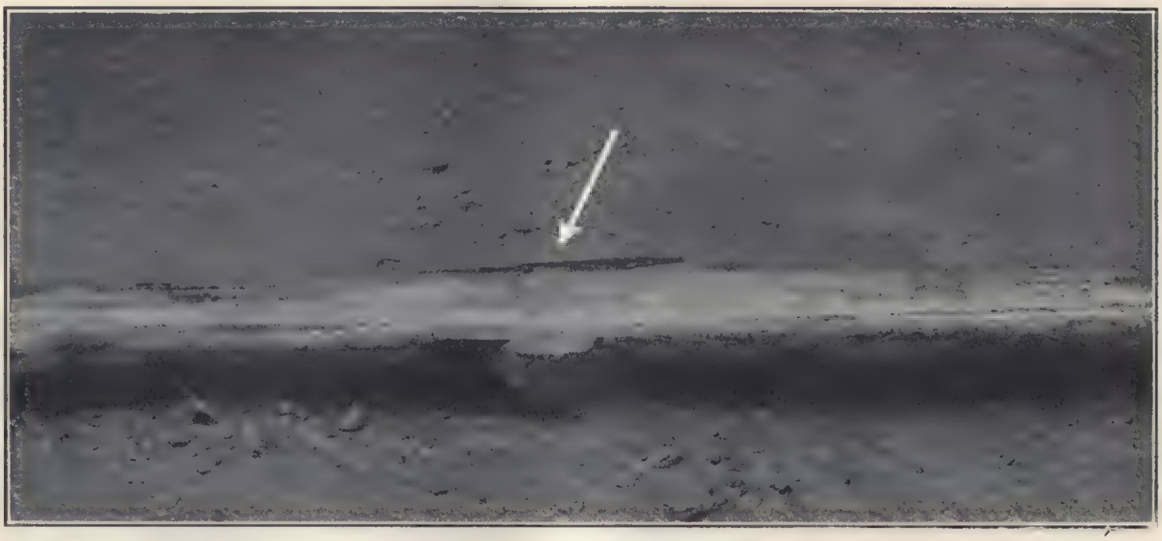
Bates engineers will be glad to submit prices and other data on this installation or for any special conditions to be met in proposed work.



This illustration shows Bates Poles on the west track of the Northwestern "L," north of Argyle station. The first pole is bolted to the outside of the retaining wall, and the others are the standard step mounting. The three east tracks will be operated by third rail.

Take any Evanston train on the Northwestern Elevated, and see this installation for yourself. You will be able to form your own opinion of this construction, and we will be able to supply any data on costs you wish to see.

Miles of Trac



Close-up of the improved, low cost, "Center Pour" Thermit weld installed in Milwaukee, where this method has been adopted on an extensive scale.

Be sure and watch us actually demonstrate the making of a Center Pour weld at the Chicago Convention.

For economy in—

Rail Joint Welding

Home-made Frogs and Crossings

Repairing Broken Castings

Our expert operator will teach your own men, both in track and shop departments the fastest and most efficient methods of handling the apparatus. Any employee of average intelligence can learn quickly how to secure best results.

Write for demonstration.

Metal & Thermit Corporatio

vithout a joint!

Rail Joint Maintenance Costs Eliminated

Thermit

Insert Welds

Make Record Economies

In San Antonio, Tex.

Because the Thermit method is the only practical fully welded joint, which absolutely eliminates the break between the rail ends. It forms a solid, continuous section, equally strong, and equal in electrical conductivity to the unbroken rail. No rail bonds needed. That is why we get many such reports as this, where Thermit Joints are installed.

"The First Cost is the Last Cost"

From the San Antonio Public Service Company comes the following information:

1. **"Our experience dating from November 1913, is that Thermit Insert Rail Joints give satisfactory service.**
2. **"First cost is last cost, and first cost on about 40 miles of track averaged approximately $8.00 each per joint." (Low as this figure is, improvements in the Thermit process since these joints were made have materially reduced the cost per joint)**
3. **"The first of the welds, made in November, 1913 are still in service, and in apparently as good condition as when installed.**
4. **"We have no maintenance on this type of joint.**
5. **"We are satisfied that this is the only commercially practicable method of eliminating the joint."**

An echo answers—"the first cost is the last cost,"—on dozens of roads where Thermit Insert Welds have done away with joint maintenance troubles.

Get full information at our Convention Exhibit
Booths 5-8, Section C

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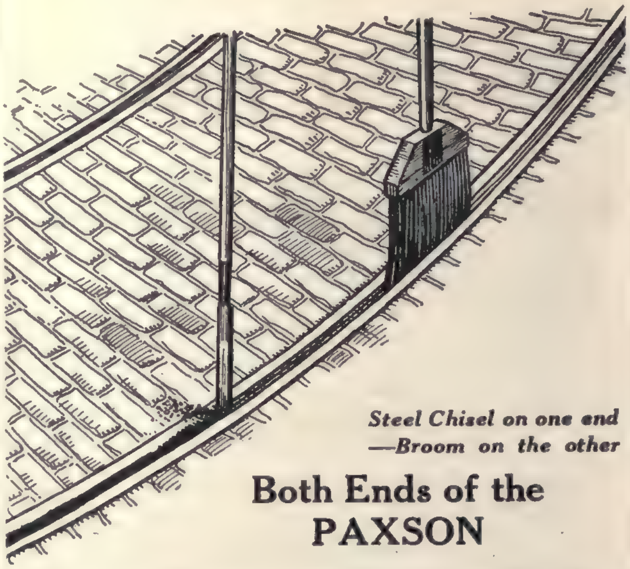
This Toncan Metal Corrugated Culvert sold by us and installed under the Toledo & Indiana Railway in 1908, is still in good condition. Toncan Culverts endure. They are anti-corrosive! Write for prices.

THE CANTON CULVERT & SILO CO.
Manufacturers
Canton, Ohio

GET OUT, DIRT!



Steel Chisel on one end
—Broom on the other

Both Ends of the PAXSON Track Broom are *Business* Ends

—for which reason they have been the choice of railway men for 25 years.

Made of flat steel spring wire. Fits frogs, switches and grooves. Has strong ash handle with steel chisel on other end. Broom is light in weight but strong in construction. Send for a sample—you will be pleased.

J. W. PAXSON CO.
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Nicetown Lane and D St., Philadelphia, Pa.

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832 pages, flexible. 4 x 7, over 600 illustrations, $4.00 net, postpaid.

A pocket encyclopaedia of practical information on electric railway work. This book contains the data, formulae and tables that are constantly required by the operating, constructing or designing engineer. It is a book which may be used by the non-technical manager as well as the engineer.

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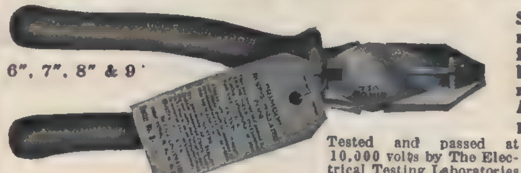

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"The only SAFE PLIERS for linemen and all high tension work"

6", 7", 8" & 9"

Semi-soft rubber insulation bounded to metal by *Elchemco* process.

Tested and passed at 10,000 volts by The Electrical Testing Laboratories of N. Y. C.

Insulation cannot crack or work loose

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SPECIALISTS in the **Design and Manufacture** of *Standard—Insulated—and Compromise Rail Joints.*

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A Test in Time—

like the proverbial stitch, saves a lot of trouble and expense later on. Broken and defective bonds, neglected for any length of time, inevitably lead to poor voltage conditions, loss of power and electrolysis in neighboring gas and water mains.

Why take chances with rail bonds? It costs but little to keep them checked up.

With a ROLLER-SMITH Portable Bond Tester, especially designed for fast and accurate readings under electric railway conditions, one man can test out every joint on several miles of trackage per day. Then you *always* know the condition of your rail bonds.

It Pays to "learn the truth"

ROLLER-SMITH BOND TESTERS

1. **Simple, rugged, and reliable.**
2. **Easily and rapidly handled by one man.**
3. **Saw-tooth contact teeth which "bite" into rail.**
4. **Clear scale reading in units of feet of rail.**

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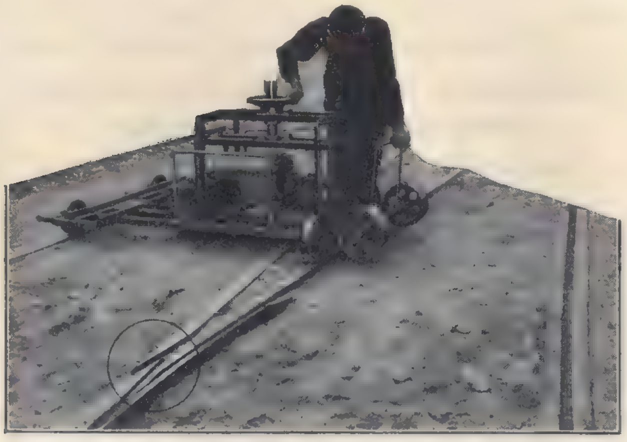
The Rail Grinder for You to Get—*Now!*

Track rehabilitation at lowest cost—that's the problem every roadmaster is facing today. Bad joints to be repaired, broken special work to be built up, and corrugations to be smoothed out—this work must be done to save existing track structures from going to pieces.



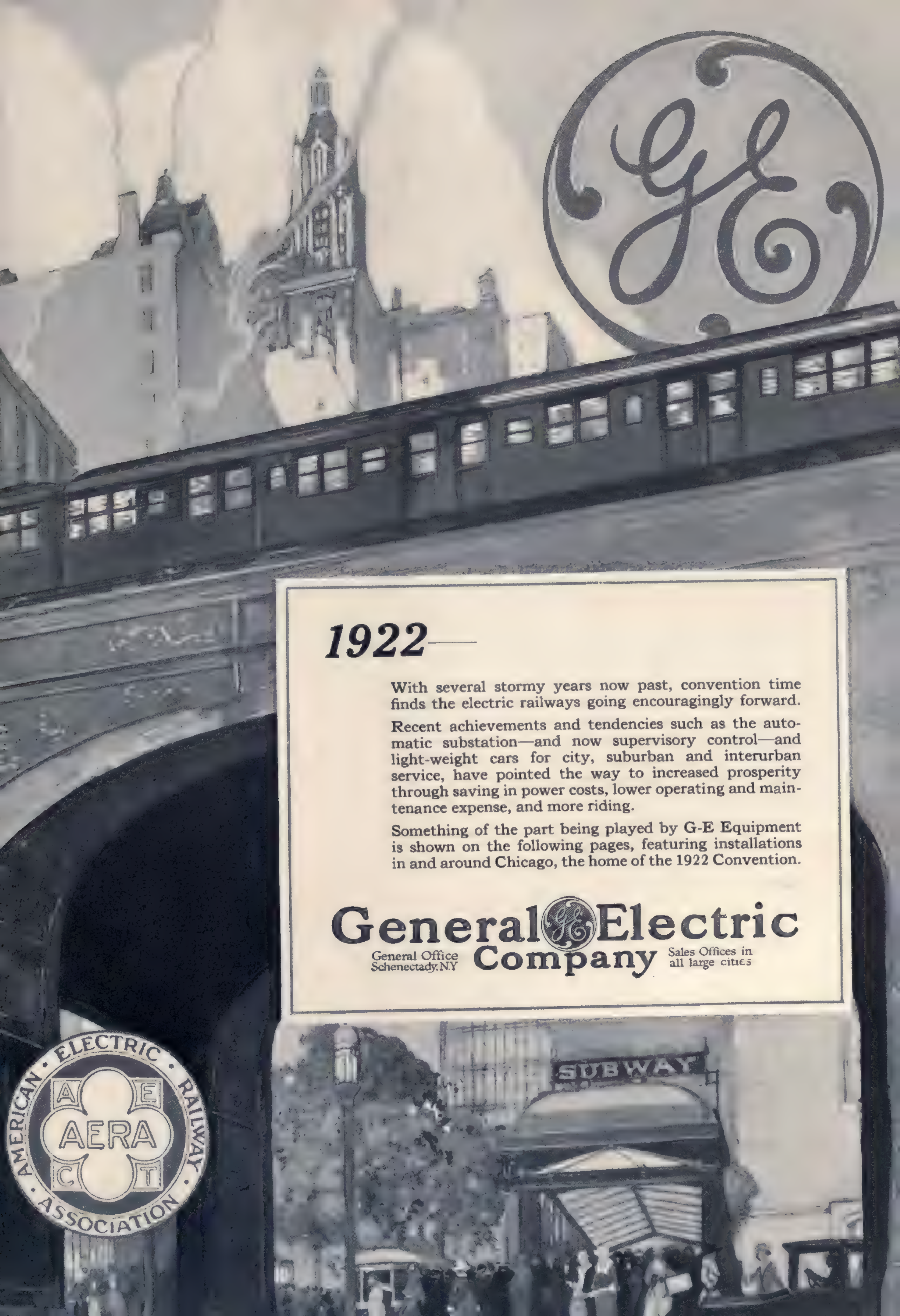
The Seymour "Midget"—a light, inexpensive but thoroughly practical and efficient rail grinder is the machine you need at once. Get started now, while weather conditions are favorable.

Learn the Full Details

It will pay you to look into the proposition. Our booklet and circulars contain valuable information for the track department. Let us tell you about the possibilities and the price of the Seymour "Midget"!

Write us today

E. P. SEYMOUR RAIL GRINDER CO.
Waltham, Mass.



1922—

With several stormy years now past, convention time finds the electric railways going encouragingly forward.

Recent achievements and tendencies such as the automatic substation—and now supervisory control—and light-weight cars for city, suburban and interurban service, have pointed the way to increased prosperity through saving in power costs, lower operating and maintenance expense, and more riding.

Something of the part being played by G-E Equipment is shown on the following pages, featuring installations in and around Chicago, the home of the 1922 Convention.

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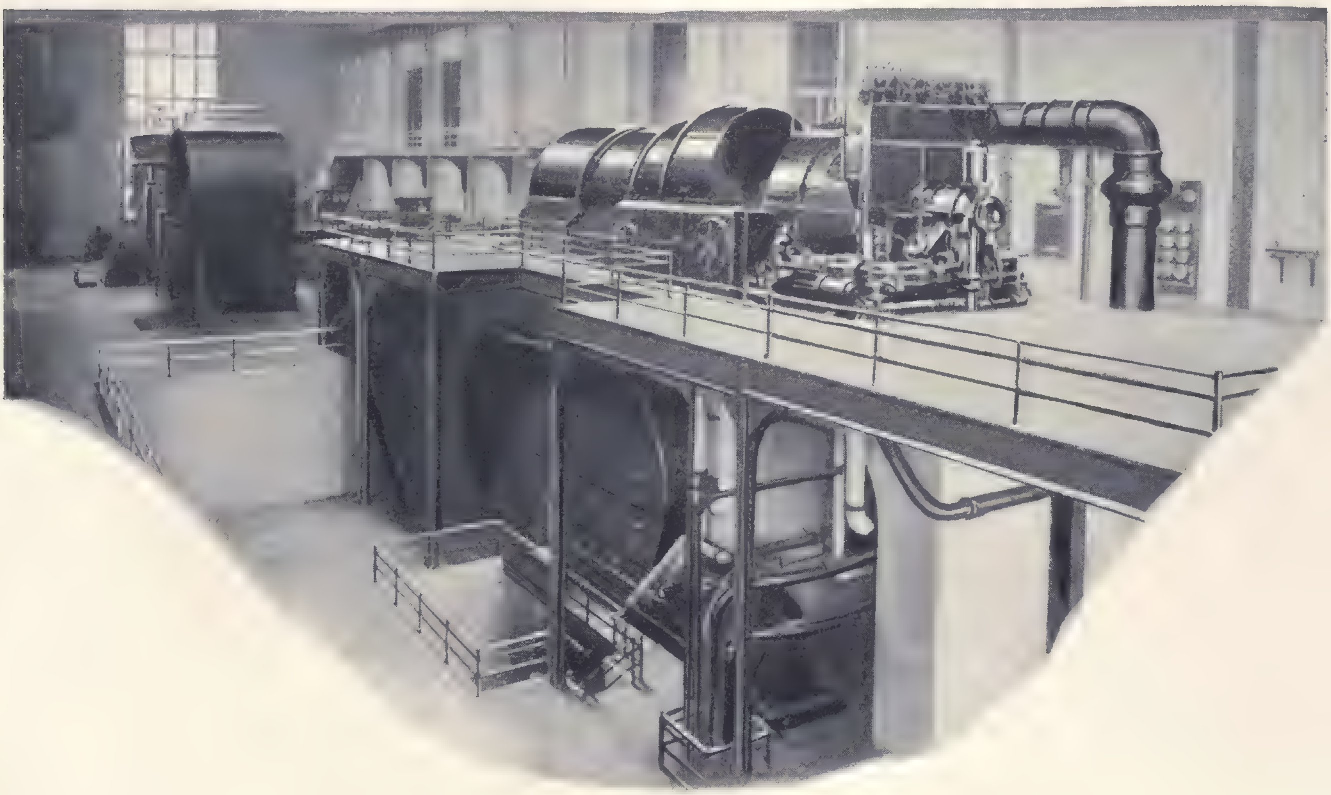
Schenectady, N.Y.

Sales Offices in
all large cities

Back of Every Car and Train



The Mighty Turbines

The fruits of a broad-minded policy have ripened in the wonderful stations of the Commonwealth Edison Company, which, with the completion of the fourth plant—at Calumet—have attained the impressive total of 539,000 kilowatts capacity.

Reliability and economy have made these stations the sole source of power supply for the 1200 miles of Chicago's elevated and surface lines, for other railways in and around Chicago, as well as for industrial needs.

In all this work G-E equipment is doing its full share. The latest contribution is a 12,000-volt, three-phase, 60-cycle, Curtis turbine which, at 85% power factor develops 30,000 kw.—enough to meet all the electrical requirements of a medium-sized city.

General Electric Company

General Office
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Sales Offices in
all large cities

31-32

For More Car-miles and More Riding

G-E Automatic Substations

The safety car has been a means of giving more and better service at less cost. Similarly, G-E automatic d-c. substations are raising income and cutting costs by making provision for more car-miles, by conserving man-power, and by promoting patronage through the attainment of faster schedules and better illumination.

G-E Automatic Station Control Equipments are assuming responsibility for maintaining in operation important distribution systems, supplying various kinds of service, with but slight supervisory control. Railway installations of G-E Supervisory Control for the Ravinia and Lake Bluff stations of the Chicago, North Shore and Milwaukee are now in operation.

The complete automatic station can be controlled with only two wires from the dispatcher's office. The dispatcher has before him continuously a visible indication of the operating position of the switching equipment on the system and by means of a few control keys can change the set-up as required.

Progressive electric railways are investigating this new G-E development.

General Electric Company

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Sales Offices in
all large cities

25-171

The Fastest Street Railway In the World

Chicago Surface Lines

The wide-door, low-step, quick-accelerating car is by far the most efficient vehicle in surface transport today. Schedule speeds of 10 to 11 m.p.h. and higher make the Chicago Surface Lines the fastest street railway in the world.

And this in spite of the fact that within the congested Loop the running time at the peak (5 to 5:30 p.m.) is reduced to 5 m.p.h.

Such operating conditions call for two essentials: Rolling stock which permits maximum speed in passenger interchange; and motors that run cool and efficiently, whether in the slow crawl through the loop or on the long fast runs outside.

G-E motor control and air brake equipment has been extensively used on the Chicago Surface Lines for years.

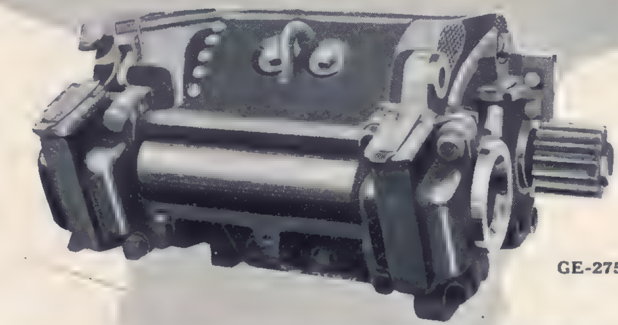
General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-160

One Motor for One-man Cars and Trains



GE-275

366 Motors Just Ordered

Standardization means simplification.

The GE-275 motors recently ordered for the Chicago Surface Lines are interchangeable on either the 69 double-end, wide-platform, two-man cars to handle trailers or on the 45 new light-weight, one-man cars. In brief, the same motor will be used as four-motor equipments on the big cars with trailers and as two-motor equipments on the smaller cars.

Thus, the Chicago Surface Lines strive to give the most service with least upkeep. And the adaptable GE-275 motor pointed the way.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-161

10 Miles of Train an Hour on the Elevated

GE-243

3 Armature Failures a Year

In the years 1914-15, the Chicago Elevated Railroads purchased 324 GE-243 motors.

These motors have had no difficulty in meeting the higher rates of acceleration and heavier loads which have been required by the increased traffic of recent years. As proof of this, during these eight years the company has reported twenty G-E armature failures—less than three a year.

Such a record, on a system that cannot afford to have a breakdown, means more than low maintenance cost per mile. It means uninterrupted service, a saving of revenue miles.

Some G-E railway motors have exceeded expectations. That the Chicago Elevated appreciates the success of the GE-243 is evidenced by a recent order for 60 more, duplicates of the 1914-15 order.

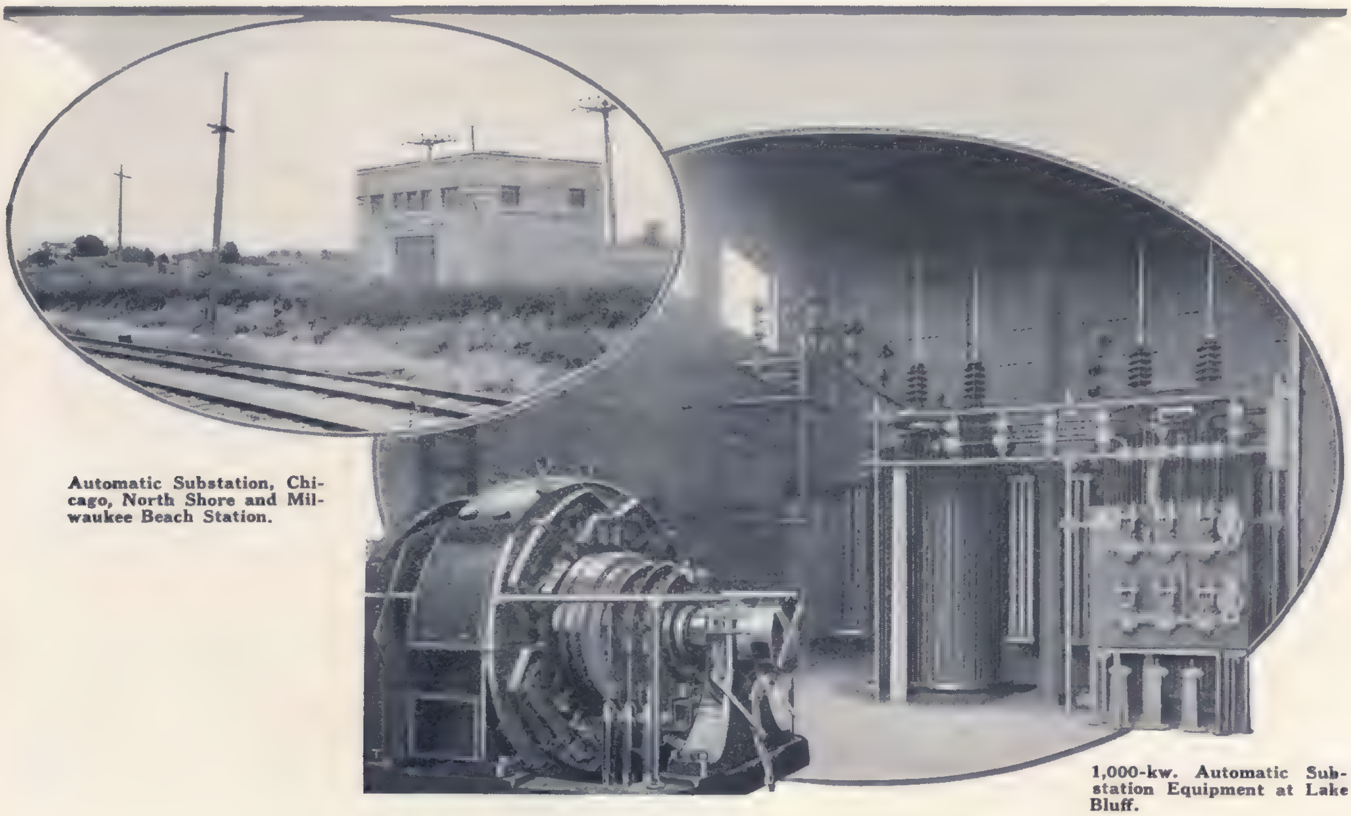
General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-162

"The Road of Service" uses Automatic Stations



Automatic Substation, Chicago, North Shore and Milwaukee Beach Station.

1,000-kw. Automatic Substation Equipment at Lake Bluff.

And G-E Supervisory Control

Steam road, boat, and motor competition have not retarded the growth of the Chicago, Milwaukee and North Shore Railroad, with a management that has set new and better standards.

Maintaining schedules punctually on an 85-mile, double-track, interurban calls for the best possible distribution system. Low voltage cannot be permitted. A solution was found in the automatic substation.

More than 5 years of automatic substation operation are being followed by installations of G-E supervisory control. These pioneer installations have been made for the Lake Bluff and Ravinia Stations, placing the substation apparatus under the direct supervision of the train despatcher.

Confidence in this new G-E automatic control equipment for the North Shore has been established by its stations now in operation: 7 automatic substations, 7 manually operated, and one portable, totalling 15,400 kw.—all G-E equipped.

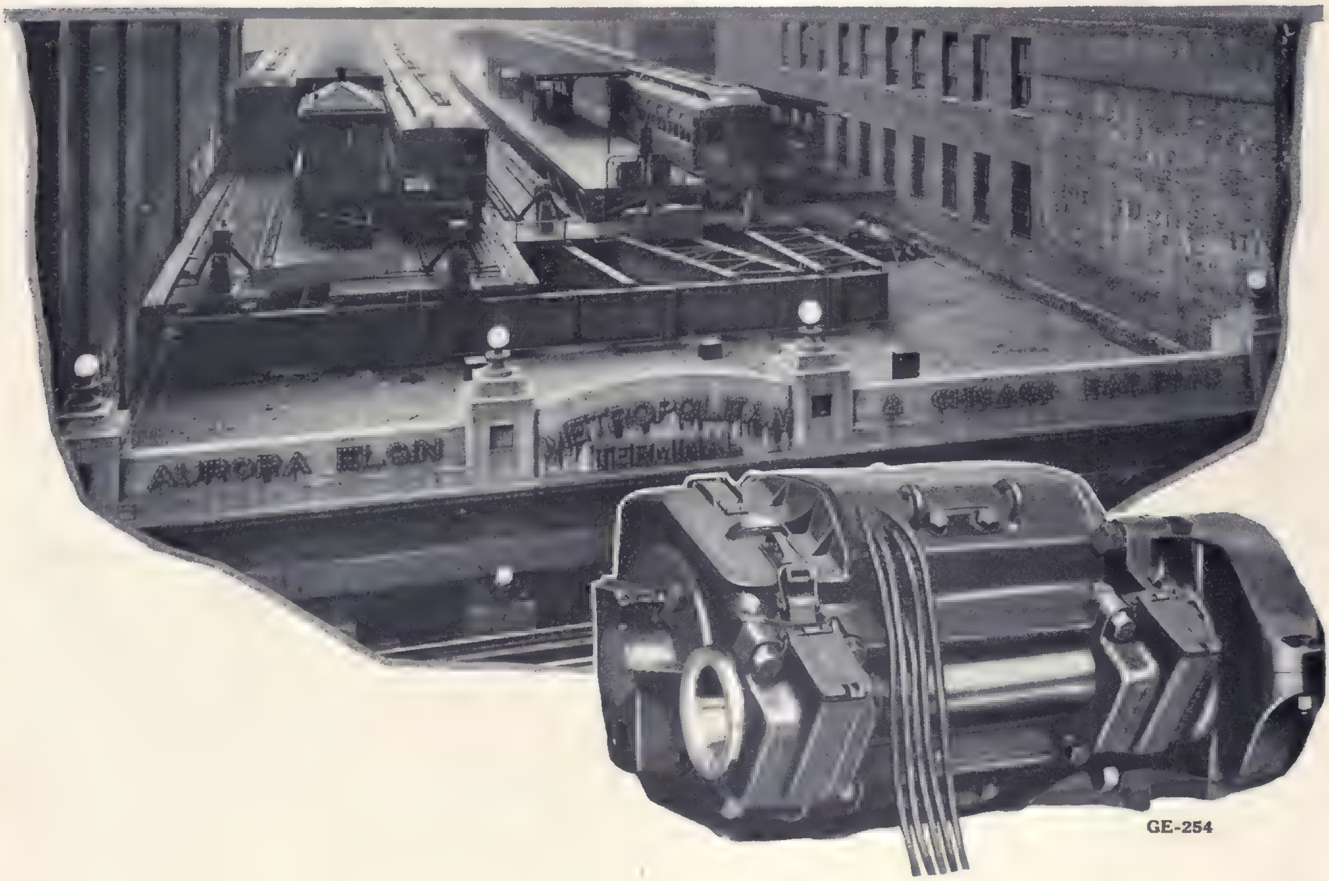
General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-163

Third-rail Road Adds More Equipment



GE-254

Standardized on "G-E"

One of the great third-rail systems of America, the Chicago, Aurora & Elgin Railroad, has just completed 20 years of service. Reorganized now as a purely heavy-traction system, this road is on its way to still greater usefulness as shown by its recent order for 20 steel passenger cars, including a diner.

For years, G-E motors have been standard on the Chicago, Aurora & Elgin, first used in fours on the motor cars and then in pairs on motorized trailers. For its new rolling stock, G-E motive equipment was selected because of the reliable performance that has been given by the older G-E equipment in this severe service.

So that, equipment for the 20 new cars includes GE-254 motors and type M control, duplicating that now in operation.

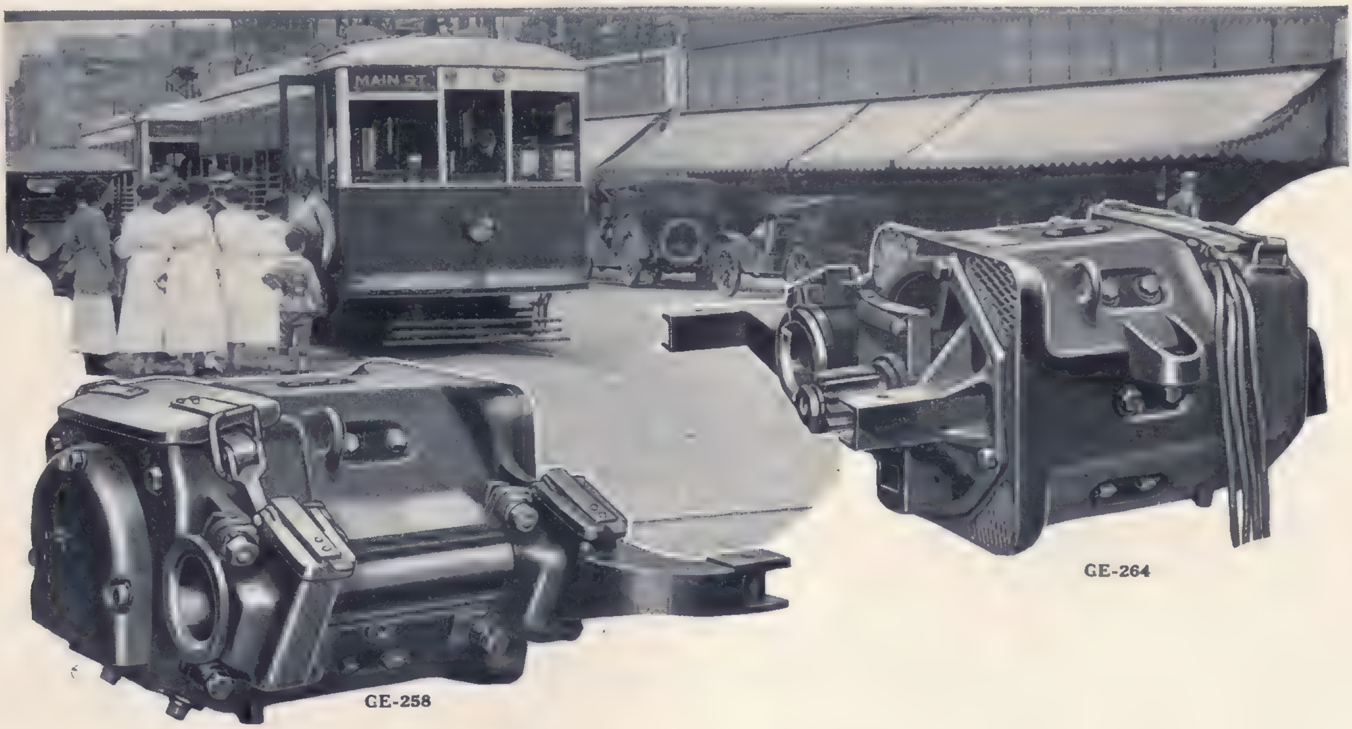
General Electric Company

General Office
Schenectady, N.Y

Sales Offices in
all large cities

25-164

200 Safety Cars on the Illinois Traction



All G-E Equipped

The success of Safety Cars on the Illinois Traction System is manifested by a recent order for 95 new equipments, duplicates of those now in operation.

More than 200 Safety Cars—equipped with G-E motors and control—are effecting large annual savings and improving public relations on the following Illinois Traction properties:

	No. of Cars
Decatur Railway & Light Company	26
Peoria Railway Company	38
Quincy Railway Company	30
Topeka Railway Company	18
Wichita Railway Company	52
Urbana & Champaign Railway Co.	15
Bloomington & Normal Ry. & Lt.	11
Danville Street Railway & Light	16

There are 200 other properties operating more than 3300 Safety Cars—all equipped with GE-264 or GE-258 motors and K-63 control.

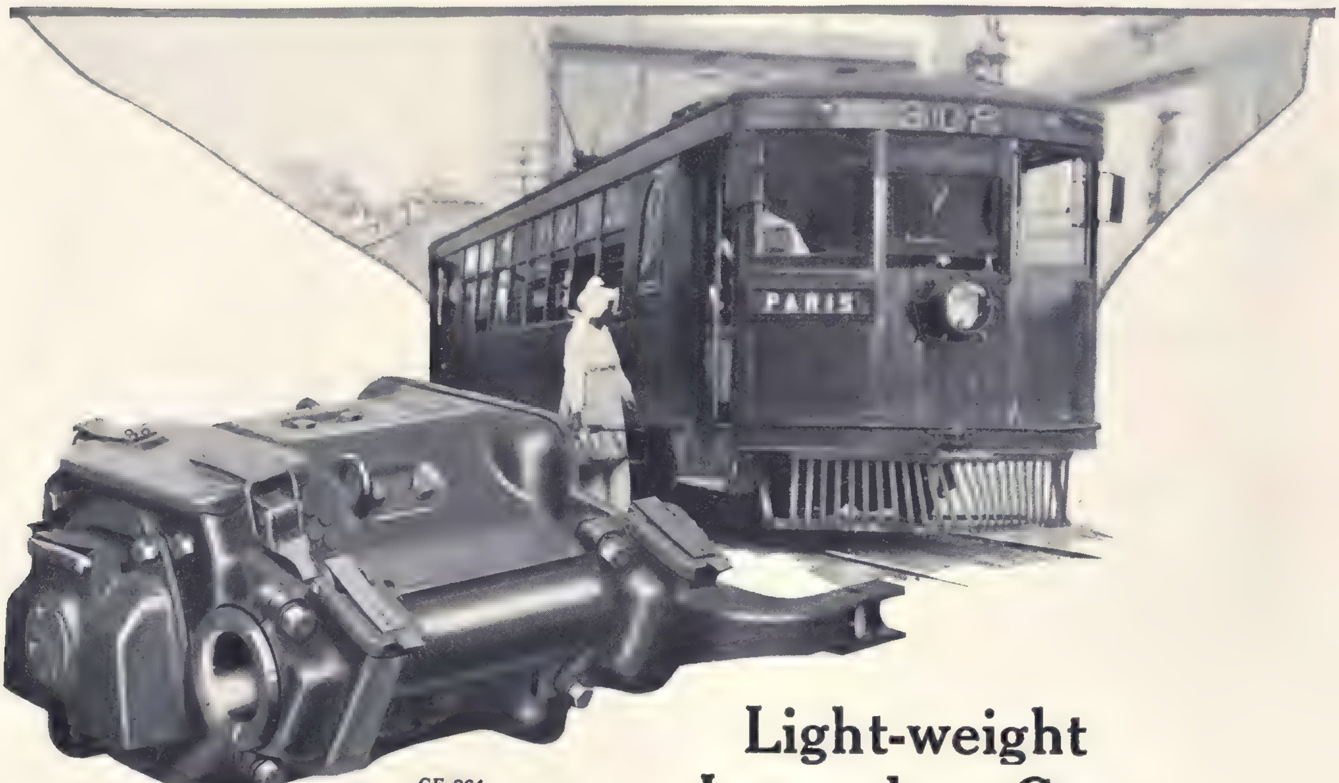
General Electric
Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-165

Working Wonders With Operating Costs



GE-264

Light-weight Interurban Cars

The electric railway that adapts its equipment to conditions will remain master of mass transportation in its territory.

For instance, the Kentucky Traction & Terminal Company: Two months after it replaced its two-man, 76,000-lb., 52-seat cars, operated at 90-min. intervals, by one-man, 25,000-lb., 45-seat cars on an hourly schedule, the buses paralleling its route discontinued service.

Ten of these 12-ton cars, equipped with GE-264 motors, K-35 control and CP-27 compressors, are in operation. They have proved popular with the riding public and extremely economical for the company.

Installations of cars of similar design, also G-E equipped, are in successful operation on the interurban roads listed. They point the way to profitable operation for hundreds of medium-traffic lines.

	No. of Cars
Kentucky Traction & Terminal Company	10
Cincinnati Lawrenceburg & Aurora	7
Union Traction Co., Nashville, Tenn.	6
Cincinnati, Milford & Blanchester Trac.	3
Pittsburg County Rwy., McAlester	3
Toledo & Western R.R.	3
Youngstown & Suburban R.R.	2
Portsmouth (Ohio) St. R.R. & Lt. Co.	6
Dayton, Springfield & Xenia So. Rwy.	2
Bangor Railway & Elec. Co.	6
Interstate Public Service Co.	5
City Railway Co., Dayton, Ohio	30
Boston Elevated R.R.	100
Eastern Mass. St. Railway Co.	10
Tampa Electric Co., Tampa, Fla.	4
Cincinnati, Georgetown & Portsmouth R.R.	5
Androscoggin & Kennebec	1

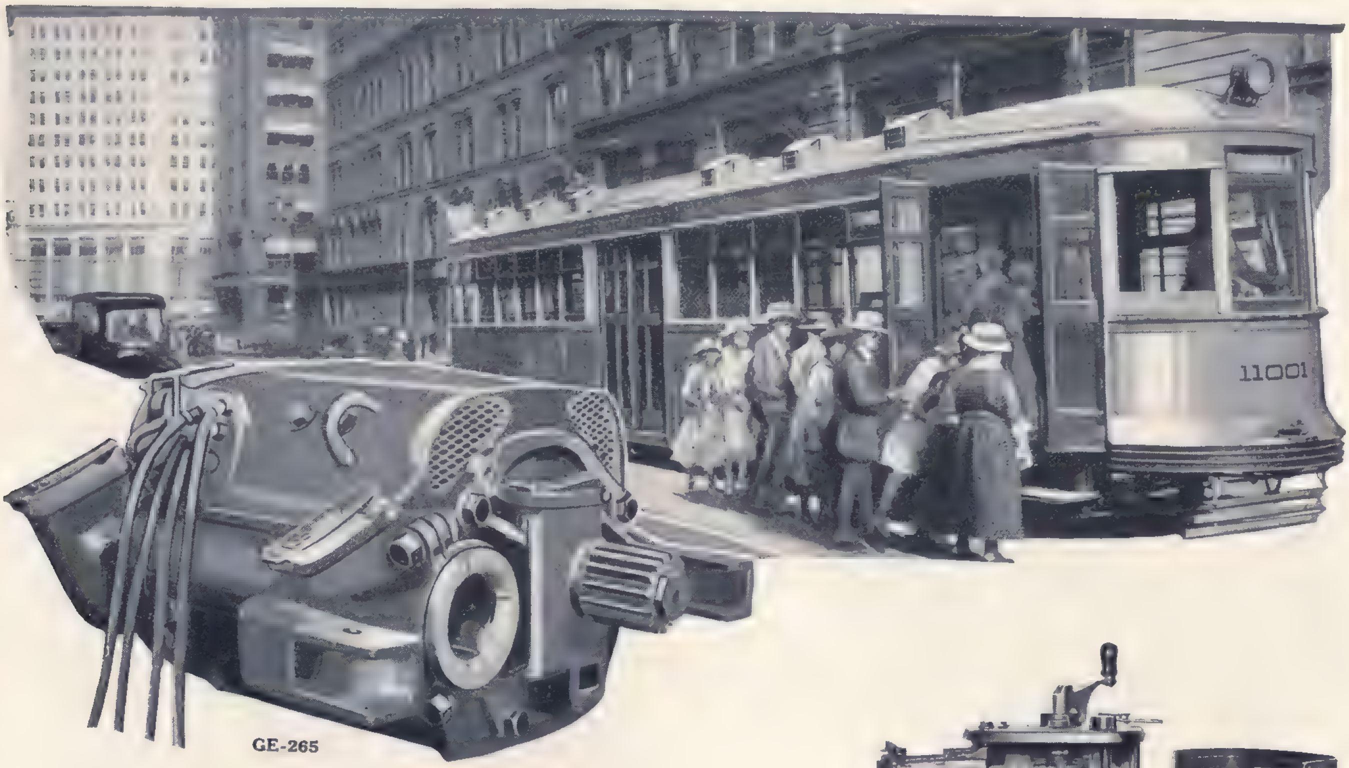
General Electric Company

General Office
Schenectady, N.Y.

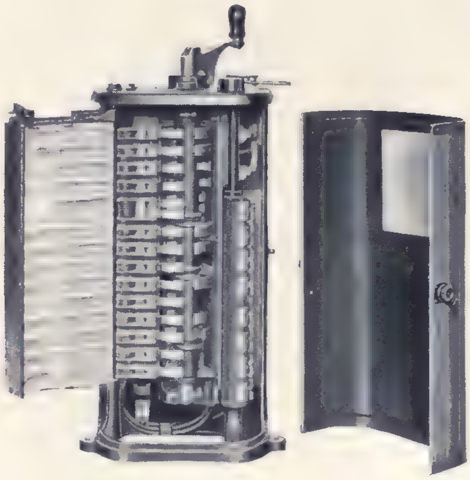
Sales Offices in
all large cities

25-166

Detroit's 200 New Cars Making Good



GE-265



K-35
Controller

Light-Weight City Cars

The rehabilitation of the Detroit Street Railway is being undertaken with the most modern equipment. For instance, 200 new light-weight, double-truck cars are being equipped with GE-265 motors and K-35 control. CP-27 air compressors are also used. This equipment duplicates that on 50 cars which have been in successful operation for more than a year.

This same equipment has been selected for light, double-truck cars on the following railway properties:

	No. of Cars
City of Detroit	250
United Railway Co., Providence, R. I.	150
Georgia Rwy. & Power Co., Atlanta	20
Dallas Interurban Railway Company	7
Western Ohio Railway Company	10

General Electric Company

General Office
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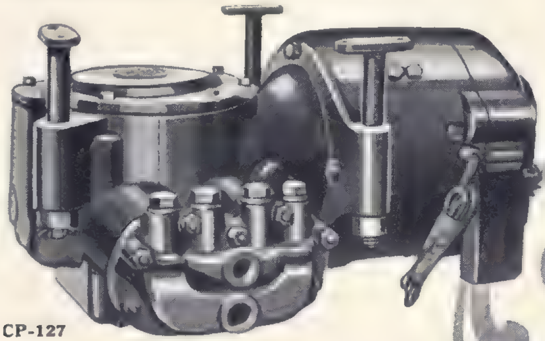
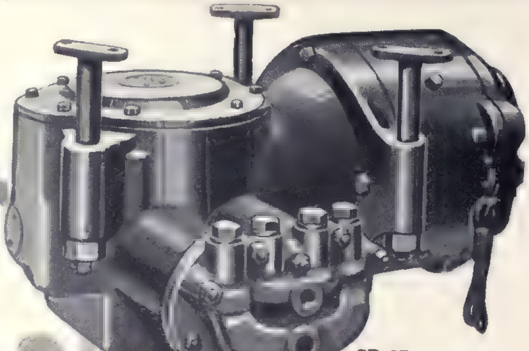
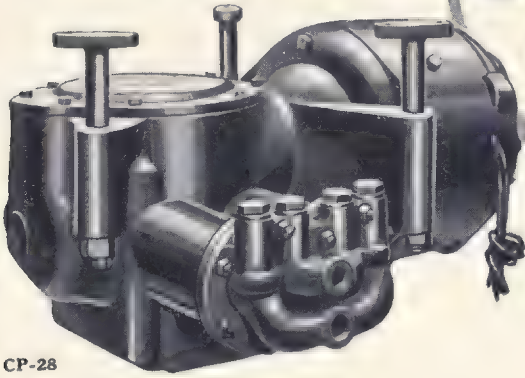
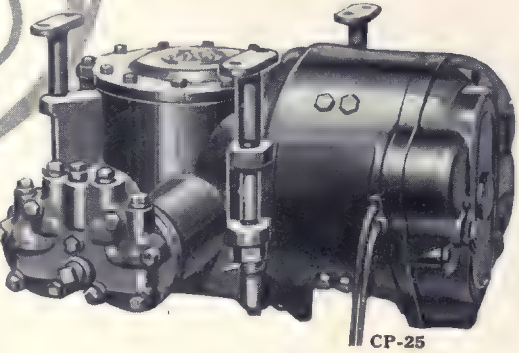
25-167

Type CP—the Low-Maintenance Compressor


CP-127


CP-27


CP-28


CP-25

The best recommendation for any equipment is continued repeat orders. Low operating costs of General Electric CP center-gear type Air Compressors have resulted in recent repeat orders from the following companies:

	No. of Cars	Type
Buffalo & Lake Erie Trac. Co.	25	CP-25
Virginia Railway & Power Co.	50	CP-27
United Traction Co., Albany, N. Y.	55	CP-27
Public Service Ry., Newark, N. J.	100	CP-27
New Orleans Railway & Light Co.	100	CP-27
Indiana Service Corp., Ft. Wayne	15	CP-27
City of Detroit	100	CP-27
Chicago Surface Lines	45	CP-27
Chicago Surface Lines	69	CP-127
Interborough Rapid Transit Co.	75	CP-28

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-168

ELECTRIC RAILWAY JOURNAL

Volume 60
Number 13

New York, N. Y.
September 23, 1922

Chicago Transportation Experience

This Issue—Its Aim

CUSTOM has led to the expectancy in the electric railway field that this issue of *Electric Railway Journal* would be devoted to the Chicago traction properties as Chicago is the convention city this year. The theme of the annual convention souvenir number has usually been a comprehensive description of the railways centering in the convention city, except when this was Atlantic City. A departure from the usual theme, however, seemed advisable and desirable this year, for several reasons.

In 1912 such an issue was prepared on Chicago, that being the date of the last Chicago convention. In the ten years since then the changes in the physical properties of the elevated and surface lines in Chicago have been comparatively of small proportions or importance on account of unfavorable political circumstances, and what additions have been made have been thoroughly treated in this paper as they occurred. Furthermore, in 1912 there had been under way for the previous five years a comprehensive rehabilitation of the surface lines with the adoption of certain standards of construction and design in nearly all phases of the physical construction and equipment of the surface properties. These subsequent ten years have thoroughly tested out the designs installed and have developed the defects and the strong features. Here, then, was the theme about Chicago of greatest interest and value to the men of the industry generally: What has been Chicago's experience with the kind of construction and equipment in use there under the extremely heavy traffic conditions?

The aim of this issue has been to answer that question, and to point out the successive developments made in design and construction as dictated by the experience with the previous designs. This theme of operating experience was applied also to the articles requested from the members of the elevated organization, with equally interesting and instructive results as regards rapid transit.

Again, the Chicago-Milwaukee electric railroad has had an experience in these last six years in building up an interurban system which is probably without parallel in the annals of the business. This organization has also had much experience in what is required of the various elements of the physical property of a high-speed heavy traction line. The experience along these lines is ably represented in the articles by North Shore officials which follow. They will prove of great interest and suggestive value to other interurban men.

Street railway, rapid transit and interurban operating experience, as known to these three outstanding companies of the industry, are therefore treated in the following pages. It is only regretted that twice as many pages could not be devoted to these Chicago companies, for the wealth of their experience has been by no means exhausted.

The Convention City as a Center for Transportation Study

THE annual convention of the American Electric Railway Association in Chicago this October will bring to that great central city several thousand electric railway executives, engineers and operating men. These men will come with minds open to new methods or ideas about the conduct of their business. The convention meetings and the exhibits will doubtless supply much food for reflection. But this is not all. Attendance in Chicago affords an opportunity for first-hand observation and study of the several classes of electric railroading such as is available in no other city. Here are the largest street railway system in the world with all its ramifications; the very small but well-equipped and operated street railway company in Evanston; the 190-mile system of rapid transit elevated railways; five important radiating interurban lines, including third rail and trolley, plain span and catenary, 600 volts d.c. and 6,600 volts single phase, special and M.C.B. equipment; two strictly suburban electric railways, and an electric underground freight subway. Then if the electric railway man chooses to look beyond the scope of his immediate kind of transportation service, there is in Chicago the largest and most conspicuously successful taxicab company in the world, and one well-established, successful, large motor bus company and several smaller ones.

The average railroad man can get a lesson out of the remarkable precision with which the elevated trains may be observed to conform to the schedule. There are reasons fundamental behind such service, of course, and one might spend many hours most profitably in searching into the inspection and maintenance methods in the shops, in the way department and the electrical department, for the detailed explanation. When it is considered that a considerable part of the elevated equipment is very old, this service performance reputation is only the more notable. It is made possible only through a systematic and rigid system of maintenance—unstinted

HAROLD V. BOZELL, Consulting Editor HENRY W. BLAKE, Editor HARRY L. BROWN, Managing Editor
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maintenance. But the schemes evolved and equipment adopted to lessen the cost of such maintenance may be of greatest interest, for much has been done in this direction and the elevated men are able and ready to tell about it when asked. Another matter that should not be overlooked is the recent introduction by the Elevated of the use of the pass. This is an innovation in selling transportation that has not been in use in Chicago sufficiently long to afford any real criterion as to what it may or may not do to increase elevated patronage, but there are some points in connection with the physical application of the plan that can be observed on the spot.

As to the surface lines, the extent of the system is so great and the problems involved are of such magnitude that there is plenty to arouse the keen interest of street railway operating men and to expand their imaginations in trying to grasp the vast ramifications of a system which carries 750,000,000 revenue passengers a year. In fact, to comprehend the full meaning of any proposed important change has been one of the great difficulties, almost impossibilities, on the part of the management or of experts called in, a circumstance which has developed in the company a high degree of conservatism in considering innovations in equipment or operating practice.

One may observe as much data as to wear and life of elements of street railway property in one day in Chicago as could be gained in a month in the average city, so heavy are the mileage and vehicular traffic and so severe the operating schedules. It is a common remark of many who know Chicago street car service that there are only two points on the controller—on and off. This is an exaggeration, of course, but it does characterize about how rapidly the motormen accelerate their cars. The controller is also kept right against the post during the running period and the rate of stop is as fast as the acceleration. A motorman from another city visiting Chicago and riding on the front end expressed his idea of the speed in this characteristic way: "This ain't streetcarin'; this is railroadin'." This is a rather extended discourse on "Chicago's speed," but the point of it is that the almost complete absence of "loafing along" of cars, the feeling the passenger gets of being hurried to his destination, and the close headway, probably have a great deal to do with the ability to secure the enormous business of 278 annual revenue rides per capita in a territory where both elevated railroads and buses are also important transportation factors.

For men of all departments of the street railway, there is in Chicago an opportunity to spend with greatest profit all the time that can be spared to study the working tools and practices of the Chicago Surface Lines.

The third road to which it is desired to direct particular attention is the Chicago, North Shore & Milwaukee Railroad. There are several well-operated and interesting interurban properties entering Chicago which are well worth inspection and study. But one who is interested in high-speed intercity electric railroading can scarcely discuss the North Shore Line without becoming enthusiastic. What may be learned here from first-hand observation can be gleaned perhaps from the articles herein published. The editors of this paper feel that any interurban railway man attending the convention who goes home without having ridden over the North Shore Line to Milwaukee and back will do himself and his company a great injustice.

Chicago Men Respond Generously

At a great sacrifice of time and effort, the Chicago railway men whose names are signed to the articles in this issue have responded to the request and plan of the editors to write articles setting forth certain aspects of their experience for use at this particular time. The summer for these men has been one of greatest stress, for the burdens of handling a strike have been imposed on top of the pressure of an exceedingly heavy program of new operating methods and betterments. And heaped on top of this have been the many details of arranging for the convention, much of which has devolved upon them. Nevertheless, time has been found to produce their part of Chicago's issue of the *Journal*, though several have expressed disappointment that they had been unable to make their articles all that they would wish them to be.

This generous response to the *Journal* only bespeaks the broad interest of these men in giving freely of their time, energy and experience toward the general advancement of the art. The Chicago men have much to give in the way of experience, for in their methods and in the magnitude of their properties and traffic, they are among the leaders in the traction business. Yet these men are keen to learn and take advantage of any better ways and means found by any other companies. This accounts for their willingness and desire to reciprocate by contributing to this special issue for whatever help it may be in the common good.

Safety a Most Prominent Topic at This Convention

Some ten years ago a writer in one of the popular magazines referred to the fact that at the previous convention of the American Electric Railway Association there was no paper on safety. Such a comment cannot be made on this convention. The Transportation & Traffic Association has a committee on safety which will render a report, but this is not all by any means. In fact, the subject of safety is by all odds the most prominent one on this year's program. In the first place, the convention of the Claims Association will be given up largely to discussions of various phases of safety. In addition there will be a safety address at each meeting of each of the other affiliated associations by a representative of the Transportation & Traffic Association. Finally there will be a safety exhibit of commendable magnitude among the other exhibits at the convention. The forerunner of this exhibit was that made by this year's safety committee at the midyear meeting at Indianapolis. This exhibit attracted so much attention that the one in Chicago, which is toward the end of the Pier, is certain to be most valuable. It is being prepared on the basis of showing what safety means and what must be done to provide it. The motto of this year's work might well have been "Safety Again and Always."

Another departure in the program of the Transportation & Traffic Association this year is in the adoption of a "round-table" discussion, the subject in this case being interurban problems. Of course many other topics on the program concern directly or indirectly interurban electric railways, but on this particular afternoon a definite time has been set apart for the interurbans. There should be a full attendance at this meeting.

Carrying a Billion Passengers a Year in Chicago

OF THE LOCAL and suburban riding, the elevated and surface lines carry 90 per cent, with the steam roads the next largest factor. The several railway companies supplying these services are characterized and the tendencies in their traffic cited

⁂

DURING the year 1921 Chicago and environs supplied a passenger traffic to all the local and suburban transportation agencies of well over one billion revenue passengers. In this business of supplying services equivalent to the gigantic task of handling the entire population of the United States ten times over in a year, the Chicago Surface Lines stands out predominantly with its enormous traffic of more than 750,000,000 revenue passengers. The Chicago Elevated Railroads come next with a service which was used by well over 180,000,000 passengers. These two local companies handled more than 90 per cent of the billion rides required by the public in Chicago and adjacent territory. Despite these huge totals of the local railways, it is rather startling to note that even with the very excellent service rendered at extremely low rates by these local railways, 14,250,322 persons bought the comparatively high-rate special personal transportation afforded by the Yellow Cab Company, and that probably an equal number used other taxicabs, or a total of perhaps 30,000,000 taxicab riders in 1921 in Chicago—twelve taxicab rides per capita per year.

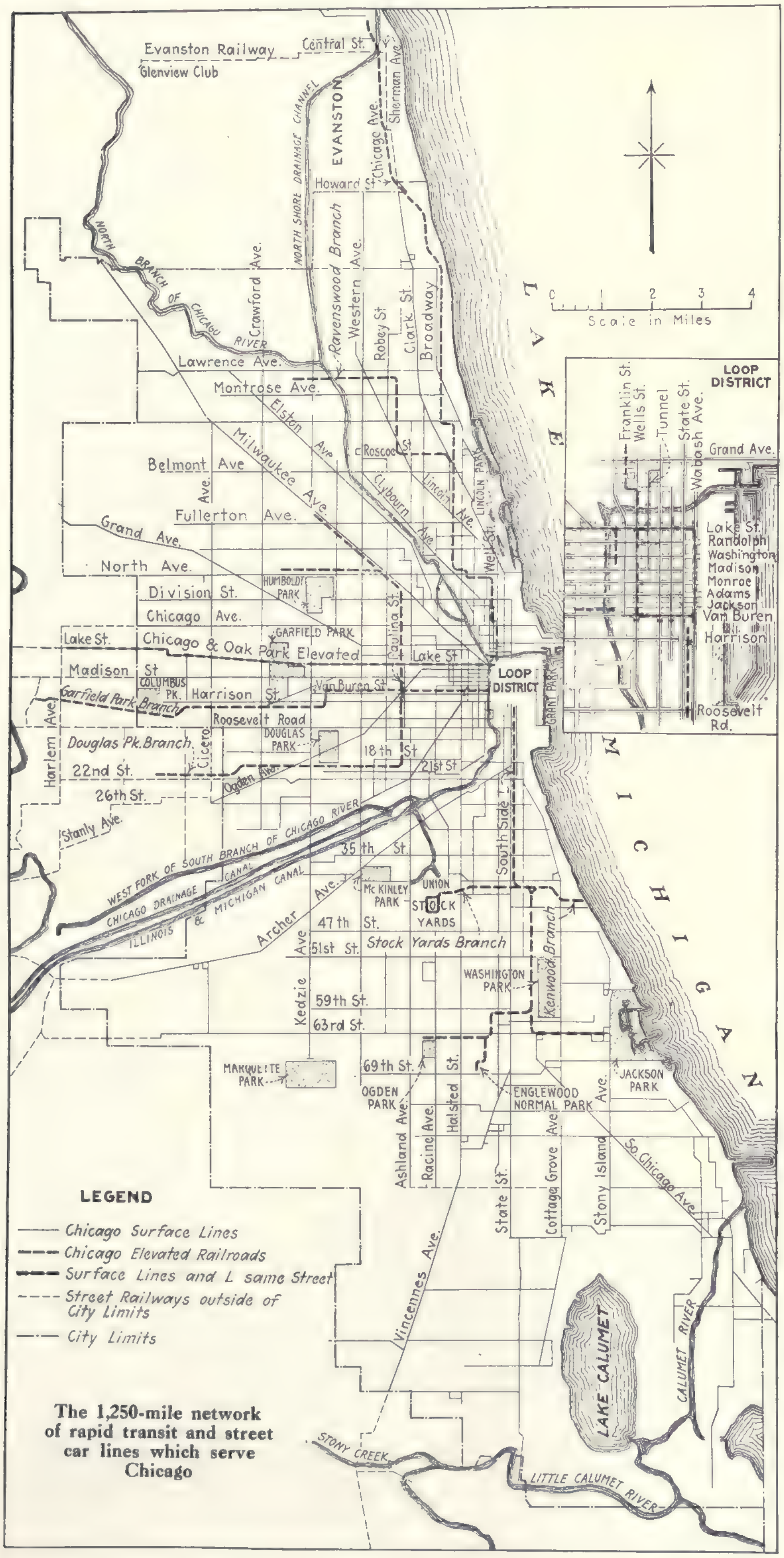
Motor bus lines, principally the Chicago Motor Bus Company, operated by a former street railway man, carried another 8,500,000 passengers. While this is a comparatively new branch of the local transportation services, the traffic available for hauling in buses is increasing at a remarkable rate, and another ten years may easily see this class of traffic climb up into totals perhaps nearing those of the elevated lines. The electric and steam lines serving the suburban riders enjoyed a business numbering more than 100,000,000 passengers, of which the larger share was carried by the steam railroads, as noted in detail in the accompanying table.

The rush-hour condition in Chicago presents the usual difficulties met with in all large cities, but it is especially acute on the elevated system, on which about 65 per cent of the twenty-four-hour traffic is hauled between 6 and 9 a.m. and 4 and 7 p.m. Some of the surface lines have an equally excessive proportion of rush-hour travel, particularly those serving the manufacturing and Loop districts, the entire surface lines system carrying 53 per cent during the above mentioned rush hours. Of the twenty-four-hour total surface lines revenue and transfer traffic, the rides between 7 and 8 a.m. represent about 16.5 per cent, and those between 5 and 6 p.m. around 18.3 per cent. Between 250,000 and 300,000 rush-hour passengers are carried into the Loop in the morning and out in the evening on the surface lines.

Unfortunately for all concerned,

Limited train on the Chicago, Lake Shore & South Bend single-phase railway passing through the sand dunes at the foot of Lake Michigan

the elevated is handicapped by a limitation of track capacity in the Loop, for which the remedy is plain but it seems quite remote of execution. Thirteen main-line rapid transit tracks converge into a two-track loop in the center of the city. The track capacity of the loop therefore largely determines the capacity to haul passengers in the rush hours.



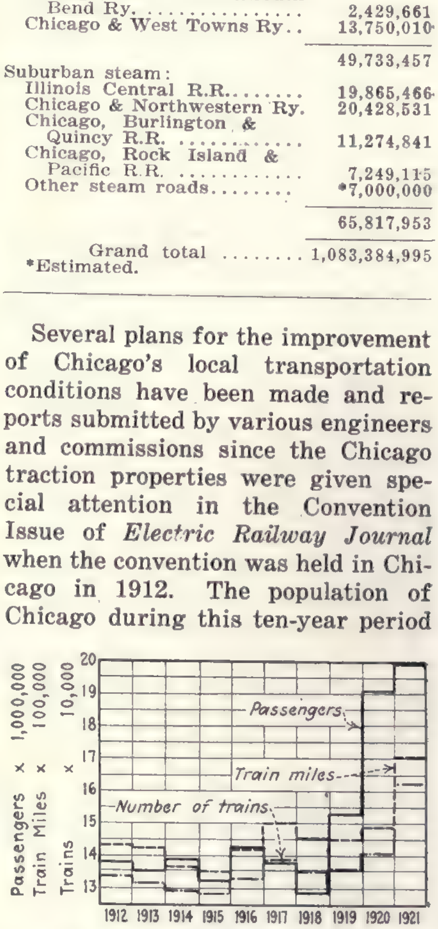
The 1,250-mile network of rapid transit and street car lines which serve Chicago

REVENUE PASSENGERS CARRIED DURING 1921 BY URBAN, INTERURBAN AND SUBURBAN SYSTEMS OF CHICAGO

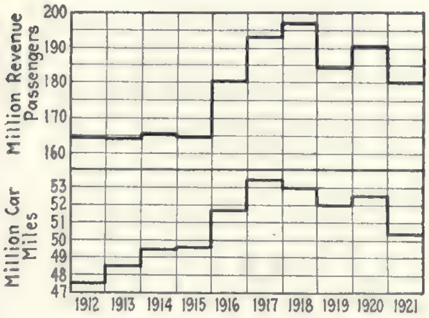
Urban electric:	
Chicago Surface Lines	750,515,622
Chicago Elevated Railroads	180,629,282
	931,144,904
Urban bus and taxi:	
Chicago Motor Bus Co.	7,774,953
Depot Motor Bus Line	653,406
Yellow Cab Co.	14,250,322
All other taxi companies	*14,000,000
	36,678,681
Interurban electric:	
Chicago, North Shore & Milwaukee R.R.	11,944,126
Chicago, Aurora & Elgin R.R.	7,631,528
Chicago & Interurban Traction Co.	2,644,447
Hammond, Whiting & East Chicago Ry.	8,529,706
Chicago & Joliet Electric Ry.	2,813,979
Chicago, Lake Shore & South Bend Ry.	2,429,661
Chicago & West Towns Ry.	13,750,010
	49,733,457
Suburban steam:	
Illinois Central R.R.	19,865,466
Chicago & Northwestern Ry.	20,428,531
Chicago, Burlington & Quincy R.R.	11,274,841
Chicago, Rock Island & Pacific R.R.	7,249,115
Other steam roads	*7,000,000
	65,817,953
Grand total	1,083,384,995

*Estimated.

Several plans for the improvement of Chicago's local transportation conditions have been made and reports submitted by various engineers and commissions since the Chicago traction properties were given special attention in the Convention Issue of *Electric Railway Journal* when the convention was held in Chicago in 1912. The population of Chicago during this ten-year period has increased from 2,185,000 to 2,700,000, or about 23½ per cent. But its transportation facilities have remained substantially the same, that is, the additional traffic resulting from larger population has been taken care of by the individual expansion of the surface and rapid transit systems. In neither case has the increased capacity been obtained by a material addition to trackage, but almost entirely by the improved operating efficiency and by the addition of more rolling stock. During the period in question the revenue



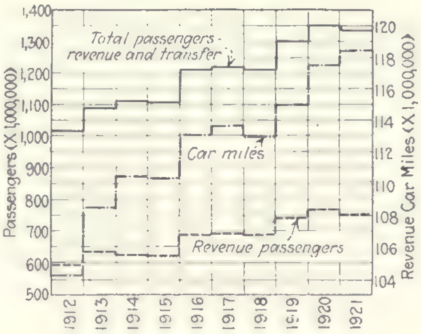
Ten-year chart of suburban traffic on the Illinois Central Railroad



Ten-year trend of traffic on the Chicago Elevated Lines

track mileage of the Chicago Surface Lines has been increased from 884 miles to 990 miles. The trackage of the elevated lines is essentially the same as it was ten years ago. During 1921 the revenue passenger traffic of the Chicago Surface Lines amounted to about 750,000,000 and that of the Chicago Elevated Railroads to approximately 180,000,000. For 1912 these two figures were respectively 594,000,000 and 164,000,000. Thus surface travel shows an increase of 24.6 per cent and elevated traffic slightly less than 10 per cent. It is seen, then, that surface car riding has tended to keep pace with the city's growth, while rapid transit riding has built up at a slower rate. The ratio of the number of revenue passengers on the surface lines to the number on elevated lines has risen from 3.6 to 4.2 over the past ten years. The per capita riding on the surface lines is now 268, which is six more than in 1912. The number of elevated rides annually per capita has decreased from 75 to 64.3 in the same period.

It is probably a fair statement that the Chicago Surface Lines represents the highest development of surface street railway service known to the industry. It is of particular interest and importance not only because of its place as the largest system of its kind in the world, but because of the speed and general excellence of the physical property and the service. This system comprises 1,060 miles of single track, forming a network of street car lines running in general either north and south or east and west with a few diagonal lines intersecting the rectangulr system, which rather completely covers the 199 square miles area of the city. The diagonal lines and a large proportion of the north and south and east and west lines pass through or terminate in what is known as the "Loop District." On all of these surface lines a transfer is allowed at practically every intersection, which results in an annual interchange of

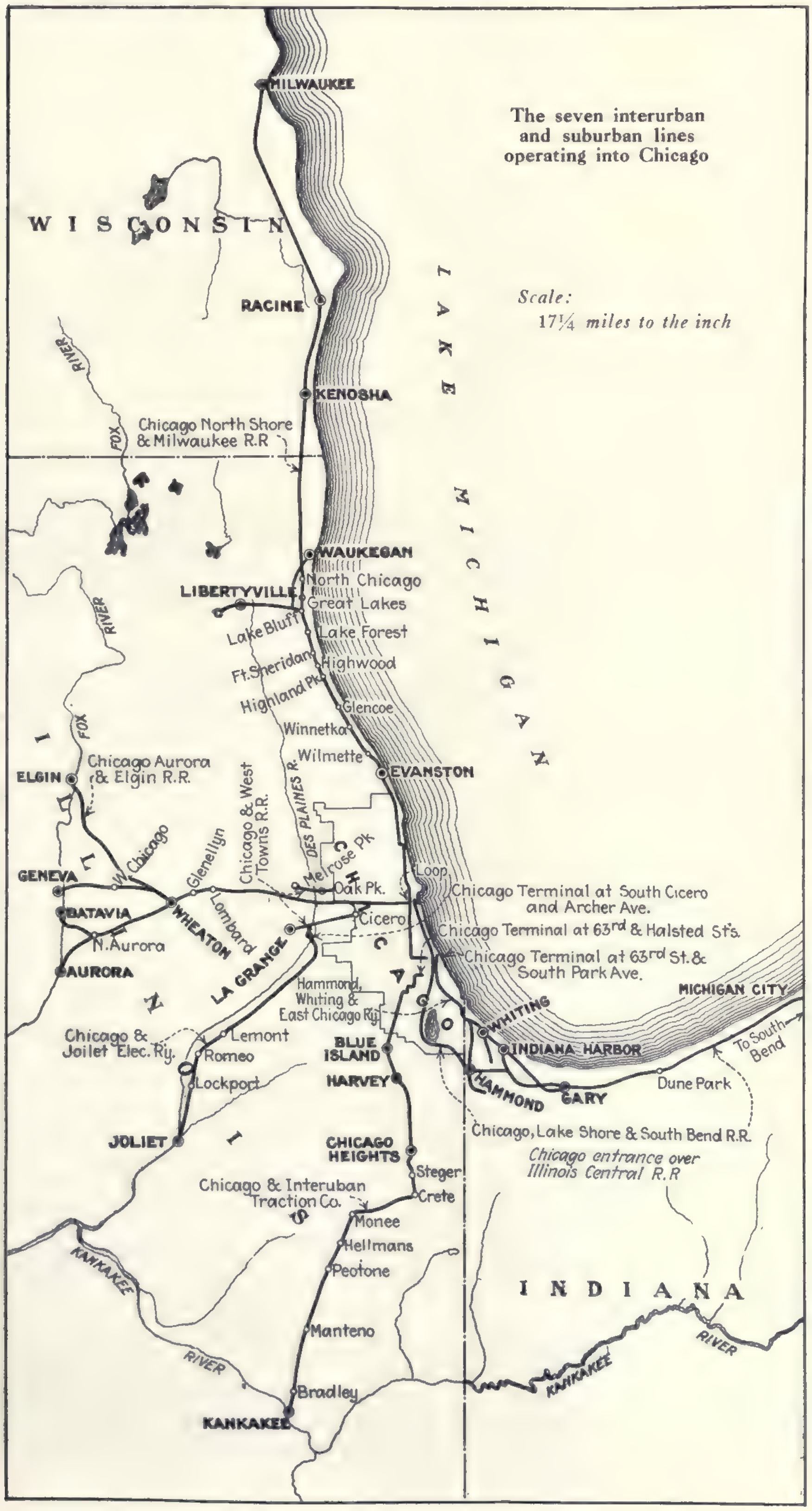


Ten-year traffic chart for the Chicago Surface Lines

At Adams and Wabash Station of the Elevated early in the evening rush hour over one-half billion passengers at some 575 transfer points.

At the present time the Chicago Surface Lines carry on an average week day about 2,200,000 revenue passengers and about 1,700,000 transfer passengers. There is a 7-cent fare with three tickets for 20 cents. The universal transferring privilege prevails with one, two or more transfers allowed a passenger as long as he travels in the same general direction. This universal transfer system has developed an average haul on the surface lines which is longer than for similar systems elsewhere. The average length of ride per fare of a surface car passenger is about 4.16 miles.

One of the operating features of the surface lines is the high average speed, which in some cases approaches rapid transit running time. In fact, the system average schedule speed, excluding layovers, is probably higher in Chicago than in any other city. This Chicago average speed is 10.64 m.p.h. On some of the outlying lines schedule speeds reach as high as 15 m.p.h., so that now many passengers using the surface lines virtually receive rapid transit service. The reason for the high speeds is partly the wide streets through which many of the cars run, but principally because of the good physical condition of the roadway and rolling stock, the ability of the cars to accelerate and retard at high rates, and the training of the men to make high speed. Owing to the large amount of special trackwork, about 10 per cent of the total mileage, a variety of routings are obtained which permit great flexibility in operation.



The lowest speeds are reached naturally in the congested Loop district. Even so, the average speed through the Loop from 4:30 until 10:30 p.m. is 6.24 m.p.h. Speeds in the Loop are lowest between 4:30 and 5 p.m., when the average is 4.83 m.p.h., but after much of the trucking has been withdrawn from the streets the speed rapidly rises to 5.57 as an average between 5:30 and 6 p.m. For the following half hour the average Loop speed is slightly more than 7 m.p.h.

ELEVATED LINES PROGRESS UNDER SEVERE COMPETITION

Perhaps the most notable things about the Chicago Elevated Railroads are the substantial progress made in amount of traffic handled and the high quality of service rendered in spite of the severe limitations imposed by the two-track loop in the center of the business district. Furthermore, the excellence of the service on the surface lines had made of them a formidable competitor for the "L," particularly on account of the immensely better availability of the surface lines for so large a proportion of the population.

The Chicago Elevated Railroads consist of four originally independent systems of elevated lines. One extends into the south side of the city, another the north side, and two operate into the districts west of the Chicago River. All, however, converge in the central business district, where they operate jointly over the two-track elevated structure known as the Union Loop, and from which Chicago's downtown section derives its reference—"in the Loop."

The consolidated elevated system offers through one-fare service north and south by trains running directly through the Loop district. By means of bridges over the tracks, free transfer privileges afford a one-fare service between the west, north and south sides of the city. Prior to 1911 the elevated railroads of Chicago were operated by different managements. During 1911 the operating unification of all of the elevated railroads was brought about by placing them under one management. In 1913 the through routing from north to south and the transfer privileges between the different roads were instituted. The elevated lines now comprise 197 miles of single track, with more than 200 stations located in general at intervals of about one-third mile. An express service is given on portions of the lines by third and fourth tracks and by a system of skipping stations on some of the two-track lines.

Modern steel car train of Chicago "L" at a Loop transfer station

The condition therefore now exists that all of the surface lines and all of the elevated lines have, respectively, been unified with a single fare and universal transfer privilege on either system. Between Wilmette and Jackson Park, a distance of 23 miles, a passenger may ride on the elevated without changing cars for a fare of 13 cents. On the surface lines the longest ride without transfer is 20 miles, while a person may ride in a forward direction by transferring a distance of nearly 33 miles.

One of the most noticeable characteristics of the traffic curve for the elevated lines is the decided slump in riding since 1918. With the increases in fares that came to both the surface and elevated lines in 1919 the differential between them was also increased. In that year there was a sharp decline in traffic on the elevated and more than a corresponding increase on the surface lines. Normalcy in this respect has not yet been reached because the 1 cent fare cut on the Chicago Surface Lines in June, 1922, again widened the gap between the two fares. The type of rider who has been lost by the elevated is of the profitable, short-haul variety. This has meant that the average length of haul on the elevated has increased year by year until now it is approximately 6.75 miles.

In spite of these handicaps the elevated has maintained a very high standard of service and practiced all economies that were possible without a detriment to the service. The continuity and reliability of its service are particularly notable when it is remembered that the only modern equipment in use on the elevated consists of 250 steel cars, of which 184 are motor cars and sixty-six are trailers. The addition of this equipment, which was placed in operation on Jan. 1, 1915, increased the carrying capacity of the roads approximately 24 per cent. To keep the average speeds as high as possible with the older equipments it has been necessary to increase their rate of acceleration to the limit of the motor endurance. In doing this, motors operate continuously at temperatures as high as 275 deg. F., and even so, motor failures are extremely rare occurrences. Delays from power interruptions are practically unknown.

INTERURBAN LINES ENTERING CHICAGO

The suburban and interurban electric lines entering Chicago are not as numerous as in some other Mid-Western cities. In all there are seven interurban and suburban electric lines that either enter Chicago or connect near the city limits with either the surface or elevated systems. Only three of these give service directly into the Loop district. The Chicago, North Shore & Milwaukee Railroad, which formerly came only to Evanston, now operates over the tracks of the Northwestern Elevated through the Loop and as far south as Sixty-third Street and South Park Avenue on the south side. The Chicago, Aurora & Elgin Railroad enters the Loop over the Garfield Park branch of the Metropolitan West Side Elevated Railroad. Through an operating agreement with the Illinois Central Railroad the Chicago, Lake Shore & South Bend Railroad, which runs to Hammond, Gary, Michigan City and South Bend, operates trains into the suburban stations of the Illinois Central Railroad, adjacent to the Loop along Michigan Avenue.

Chicago Loop Terminal of Chicago, Aurora & Elgin Railroad

Connecting with the surface lines on the southwest side of the city is the Chicago & Joliet Electric Railway, which operates high-speed interurban service into Joliet on an

Chicago & Interurban Traction Company car at terminal connection with Chicago "L"

hourly schedule. In that section also is one line of the Chicago & West Towns Railway, connecting Cicero with La Grange. This company operates another line from Oak Park to Melrose Park. A line to Kankakee, Ill., starting from Sixty-third and Halsted Streets on the south side is operated by the Chicago & Interurban Traction Company. The Hammond, Whiting & East Chicago Railway is a suburban system which extends from Sixty-third Street and South Park Avenue, Chicago, to Hammond, Whiting and East Chicago, Ind. This is operated by the Chicago Surface Lines. All of these lines to the outlying districts have helped materially to build up the suburban communities served. They are all shown in accompanying maps.

The total steam suburban service into and out of Chicago amounts to nearly 60,000,000 passengers annually. It will be noticed that of the total, the Illinois Central carries nearly 20,000,000 passengers per year, while the traffic curve for the past ten years shows that the riding reached this figure after a phenomenal increase during the past three years.

The suburban service of the Chicago & Northwestern Railway, the Chicago, Burlington & Quincy Railroad, and the Chicago, Rock Island & Pacific Railway is perhaps more accurately speaking truly suburban, while that of the Illinois Central approaches closely rapid transit city transportation. The tracks of the first three roads mentioned pass through a large non-productive territory within the city limits, while the major part of the Illinois Central traffic is within the thirty-minute zone from Randolph Street. The suburban stations on the Illinois Central are scattered frequently along its right-of-way and the average length of ride is 8.4 miles, bringing the center of traffic near Jackson Park. The average length of ride on the three other roads is considerably greater.

DATA ON THE FOUR STEAM ROADS HANDLING THE LARGEST CHICAGO SUBURBAN TRAFFIC, 1921

	Passengers	Train Miles	Avg. Number Cars Per Train	Avg. Length of Ride
Illinois Central	19,865,466	1,709,558	..	8.4
Chicago & Northwestern	20,428,531	1,836,417	7.75	15
Chicago, Rock Island & Pacific	7,249,115	550,000	7	13.3
Chicago, Burlington & Quincy	11,274,841	593,069	6.5	16.3

The average number of passengers handled on a week day is about 73,500 and on Sundays it amounts to about 25,700 passengers. During an average week more than 2,000 trains are operated or about 320 to handle the normal week-day traffic.

On a normal business day the average number of passengers carried in and out of Chicago by the suburban trains of the Chicago & Northwestern Railway is approximately 60,000. To handle this business 166 trains are necessary.

The suburban business of the Chicago, Rock Island & Pacific Railway has also shown a steady increase year by year. Last year the suburban traffic amounted to approximately 22,000 passengers on an average week-day. The increase in street railway and elevated fares in Chicago several years ago diverted a large number of people to the Rock Island service and many of these have continued to be regular patrons of the steam line.

As an indication of the growth of the suburban traffic on the Chicago, Burlington & Quincy Railroad since 1913, it may be cited that the gross passenger revenue of that road in the Chicago suburban districts increased from $666,660 in 1913 to $1,143,425 in 1921, or an increase in round figures of 72 per cent. The total number of suburban passengers handled in 1921 was 11,274,841. The annual suburban train mileage, which in 1921 was about 593,000 train-miles, showed an increase of about 65,000 train-miles over 1918, or about 12 per cent. The average length of ride per passenger on the Burlington is 16.3 miles.

Trailers have greatly improved the rush-hour capacity of the Chicago Surface Lines

Dealing with the Labor Problem

By

BRITTON I. BUDD

President
Chicago Elevated Railroads
Chicago, North Shore & Milwaukee Railroad
Chicago & Interurban Traction Company

Mr. Budd snapped at a suburban North Shore station as a Limited train whizzed through

HOW to improve the human relationship between electric railroad companies and their employees, how to bring about a better understanding of the problems of the other by each side and how to secure greater co-operation for mutual benefit are questions transcending in importance any other in the industry today. It is a question which calls for the best thought of the executives who represent the companies and of the representatives of the employees.

The electric railway industry in recent years frequently has been referred to as a "sick" industry. This characterization had reference particularly to the financial side of the business. Costs of operation kept steadily mounting higher and higher, while net revenues fell lower and lower, with the result that a "sickness" developed to which many of the lines succumbed, while most of the others were reduced to a condition of weakness from which they have not yet recovered.

When the "sickness" became acute, a consultation of doctors was called to diagnose the case and, if possible, prescribe a remedy. The doctors agreed that the industry was being slowly starved to death through ignorance of the facts on the part of the public upon which the railroads depend for sustenance. Obviously, if the diagnosis was correct, the remedy was to give the public the facts, which was done through the Federal commission, created to conduct an inquiry and make known its findings and recommendations.

To continue the simile, are there not some symptoms of "sickness" in our industry in its relations with its employees? These symptoms may not be as widespread as were the financial symptoms, nor are they as easily discernible, but the outbreaks which we occasionally see prove that they are with us and call for a remedy.

THE editors of *Electric Railway Journal* felt that an issue devoted entirely to Chicago would fall short of its mission if it did not tell something of the experience of the Chicago companies in the foremost consideration of the business—employee relations—particularly when the operating forces of these railways number so many thousands. Mr. Budd was therefore asked to contribute an article on this subject, the notable success he has had along this line being well known. Much of the reason for the success or failure of relations between management and men is a matter of intangibles. Something about the management begets the confidence of the employees—or lack of that characteristic inspires suspicion and disrespect. In this article Mr. Budd gives some pertinent thoughts from his experience on the tangible phases of how to better employee relations. That there is also present in his relations with the men that intangible something which supplies the element of confidence necessary to make the tangible remedy effective can best be judged by riding on the Elevated Lines or the North Shore Line and observing the courtesies shown to passengers and the general manner in which duties are performed.
—Editors

Both forms of "sickness" to which I have referred have a common root. Both spring from ignorance of the actual conditions, from failure to see all sides of the problem, from a lack of correct information, which latter invariably leads to acceptance of misinformation and the drawing of wrong conclusions. The remedy applied in the first case, which resulted in at least a measure of relief, may be applied with equal success in the second place, and the companies are the doctors who must apply it.

In the age before the introduction of machinery in industry, and the resultant concentration of capital, there was no acute labor problem. The employer and the employee worked side by side. The human contact was ever present. The journeyman looked forward to the day when he would become a master. There was little room for misunder-

Under the complexities of our modern industrial system all that has been changed. The employer of today, at least in our industry, is not an individual but a corporation composed of hundreds or thousands of individuals, who may possess little or no knowledge of the business, and who have no interest, other than a financial one, in the enterprise. The human contact so necessary in the way of establishing and maintaining friendly relations is impossible when the owners of the property on the one hand and the employees who operate it on the other number in the thousands. A wide chasm has been opened between the owners and the employees out of which arise all the mists of misunderstanding which cloud the vision and destroy the mutual confidence which is so desirable.

How is that chasm to be bridged and the human contact and mutual confidence restored? Manifestly it must be done through chosen representatives from each side, meeting and discussing frankly the problems in which both are equally concerned. If we agree that most of our industrial troubles come from a lack of understanding of each other's problems, from inability to see the other's viewpoint, it follows that we can never remove the cause by remaining apart. Frank discussion across the table I have found to be the best method of removing misunderstanding. But such discussions must be frank and straightforward. The game must be played with all the cards on the table face up. When it is so played mutual confidence is established, and grievances, real or imaginary, which appeared so large when the conference began, gradually diminish in size and importance or disappear entirely.

In every large plant where thousands are employed it is inevitable that grievances of one kind or another will arise. Many of them may be trivial in character, but if they are allowed to accumulate, if they are ignored by the management, they will grow in size and importance in the eyes of the workers and eventually result in an explosion. The better way is to dispose of them as they come up. When employees know that they can bring a grievance to the management, with assurance that it will be given fair consideration and be decided on its merits, it has a wonderful effect on their attitude toward a company. They feel they are being given a square deal and that feeling is reflected in their spirit of loyalty.

Employees of a large corporation are, as a rule, totally ignorant of the financial side of its operation. This is not to be wondered at, because they have not been given an opportunity to learn anything about it. That phase usually has been considered as none of the business of the employees. I do not agree with that view. I believe it is to the interest of a company to let its employees know more of its financial affairs. There is nothing secret about the financial affairs of public service companies because they are under public regulation.

Employees are ready, even anxious, to be educated on subjects which are of vital interest to themselves and to the companies, if only they are given an opportunity. My contention throughout is that in order to remove misunderstanding we must have understanding. I know of no way in which this can be done except by letting the employees know the facts in open, frank discussion.

There is a general tendency grossly to exaggerate the earnings of every utility company, especially electric railways. Newspapers frequently print stories of the large profits being made by this company or that, without the slightest regard for the facts.

Such stories are read by employees among others and they form an idea that they are not receiving a fair share of the fruits of their labor. A spirit of hostility is engendered as they talk among themselves of the alleged profits, in which they do not share to the extent they think they should. Misconceptions of this kind could not arise were employees more familiar with the financial side of our operations.

DEFINITE PLAN TO TEACH FINANCIAL CONDITIONS

Some time ago in talking with a few of our employees I was amazed at the lack of knowledge they displayed with regard to the financial conditions existing on our properties. They were men, too, who might be expected to know more. As I thought over the matter the conclusion was forced upon me that the company was to blame rather than the employees, as it never had taken steps to educate them in that direction.

We now make provision for a depreciation of physical property. Why should not provision be made for human depreciation? The public would not, in my opinion, object to such a charge in the rate of fare to be paid for transportation service.

Out of that short conversation came an idea for educating the employees on the financial and business side of our operations. We looked around and selected Prof. Ralph E. Heilman, dean of the school of commerce of Northwestern University, to conduct a series of ten lectures on the subject. He is a man with a national reputation for such work and his years of experience as a teacher enable him to put his message across in plain and simple language, easily understood by the ordinary layman.

Notices were sent to all our men employed in a supervisory capacity of any kind, on the road, in the shops and general offices. They were offered an opportunity to attend these lectures at no expense to them, other than an evening's time once a month. While it was made known to them that their attendance would be gratifying to the management, there was nothing compulsory about it.

The result of this experiment was better than we expected, or even hoped for. Nearly three hundred men attended the opening lecture and an average of nearly two hundred attended the entire course. At the close of each lecture an hour was devoted to a general discussion of the subject, during which questions were asked and answered. The questions asked showed the interest the men took in the subject and how closely they had followed the speaker. Our idea was that if we could interest and instruct the men employed as foremen and superintendents, the information they received would be disseminated among others as occasion might arise.

We feel that our experiment in that direction was well worth while and we are considering ways and means of extending it. I make mention of this merely to show that employees are ready, even anxious, to be educated on subjects which are of vital interest to themselves and to the companies, if only they are given an opportunity. My contention throughout is that in order to remove misunderstanding we must have understanding. I know of no way in which this can be done except by letting the employees know the facts in open, frank discussion.

In my experience in dealing with committees representing the employees I have many times observed a complete change in their attitude after a full discussion in which all the facts and conditions were laid bare. It will not do to dismiss their demands with the short statement that they are impossible, although that may be the truth. They must be shown why it is impossible for a company to accede to their demands. If that is done in a perfectly frank manner, I have found that as a rule they are ready to listen to reason. That method may not always result in complete success, but it is always worth the effort, even though it occasionally fails.

PROVIDING FOR HUMAN DEPRECIATION

Sometimes I feel that there is something wrong fundamentally in our present methods of dealing with the labor problem in our industry. Even on properties where there is the closest contact between the management and the men, where the most harmonious relations obtain, there is something lacking.

It does not seem quite fair to me that an employee who has spent his life in the service of the public, for that is what it means in our industry, should be cast aside without any consideration when he becomes too old to perform his work efficiently. Provision should be made for setting aside a fund from earnings, if possible, to pay old-age pensions to faithful employees, and the setting up and maintaining of that fund should be accepted by regulative authorities as a legitimate expense of operation.

We now make provision for depreciation of physical property. Why should not provision be made for human depreciation? The public would not, in my opinion, object to such a charge in the rate to be paid for transportation service.

There is another weakness in our present system which I believe should be overcome and eventually will be. To bridge the chasm which now yawns wide between the owners of a corporation and the workers who operate the properties there should be co-partnership in the enterprise. The workers should be given an opportunity to share in whatever profits there may be through stock ownership. It should be made easy for them to acquire stock in the corporation for which they work and to give them a financial interest in the enterprise, wherever the earnings of the corporation are stable enough to insure dividends.

Such a plan would go far toward removing misunderstanding and increasing the loyalty of employees. It would furnish an incentive for greater economy and efficiency on their part, as they would feel that in some degree they were working for themselves. It would give them a better idea of some of the problems which confront those responsible for the management of the properties and would, in my opinion, result in benefit to the industry.

As long as we continue to view each other across the chasm as occupants of rival hostile camps, we are certain to have occasional outbreaks of hostilities. Even when the chasm has been bridged and the human contact has been established by emissaries under a flag of truce the result is more or less in the nature of a temporary expedient. The causes which lead to conflict still remain.

Stock ownership would be a long step in the direction of removing the cause of misunderstanding and of filling up the chasm. It is a subject which I believe deserves the most careful consideration of our industry.

How Car Design Has Progressed on Chicago's Rapid Transit Lines

By H. A. JOHNSON
Assistant to General Manager
Chicago Elevated Railroads

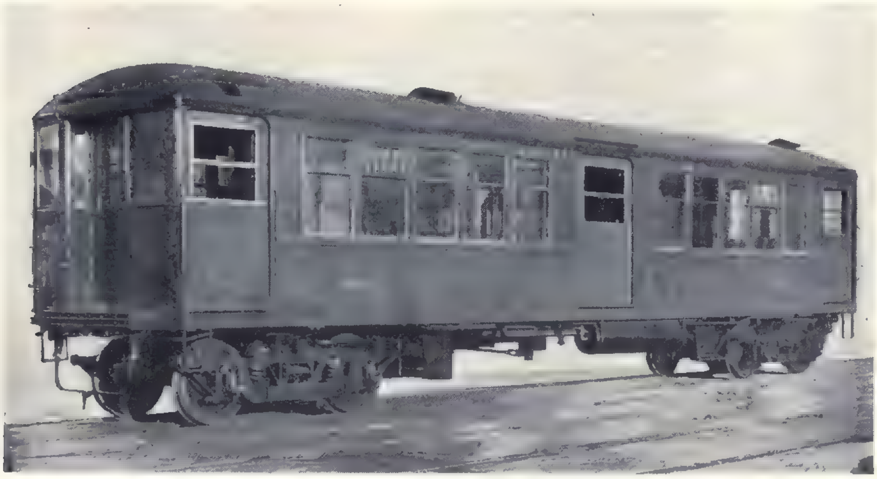
Developments in Body, Platform and Door Design, Seating Arrangement and Interior Appearance as Dictated by Experience and Study Are Brought Out—Comfort and Attractiveness to Be Features of Latest Cars—How Reliability and Lower Maintenance Costs Have Been Achieved Is Also Told

THE original elevated line in Chicago was placed in service in 1892. The structure and stations were designed and built to use a car of approximately the same size and dimensions as was then being used on the Manhattan Elevated Railroad in New York City. As additional elevated lines were built and as all of the elevated lines operated their cars around the Union Loop in the downtown section in Chicago, it was reasonable that the physical dimensions of the stations and structure clearances should be made practically the same, so that from the beginning of the system down to the present time the same length, width and height of the cars have been maintained.

The weight of the cars has been increased on account of the first ones being trail coaches operated by steam locomotives. The structure was designed sufficiently strong to support the weight of the steam locomotives and the coaches were comparatively light weight, as low as 32,500 lb. As some of these coaches were equipped with electrical equipment and as new motor cars were built to pull two and three trail cars, the weight of motor cars increased, so that the latest type, equipped with two 165-hp. motors, weigh approximately 70,000 lb. each. On account of the restrictions imposed upon the size of the car by the structure and station dimensions, all of the developments in design since the original cars were put in service have been made in the details of the car construction, as there has been no opportunity to change the over-all dimensions.

TRANSITION IN PLATFORMS AND DOORS

The cars as originally constructed were equipped with open platforms on each end and with one door in each bulkhead. The entrance and exit to the platforms was controlled by iron gates approximately 26 in. to 28 in. in width. The next general step in the arrangement of the platforms was to maintain the bulkheads in the ends of the cars with bulkhead door, but to vestibule the platforms, using full length wooden doors of approximately the same width as the iron gates. The next

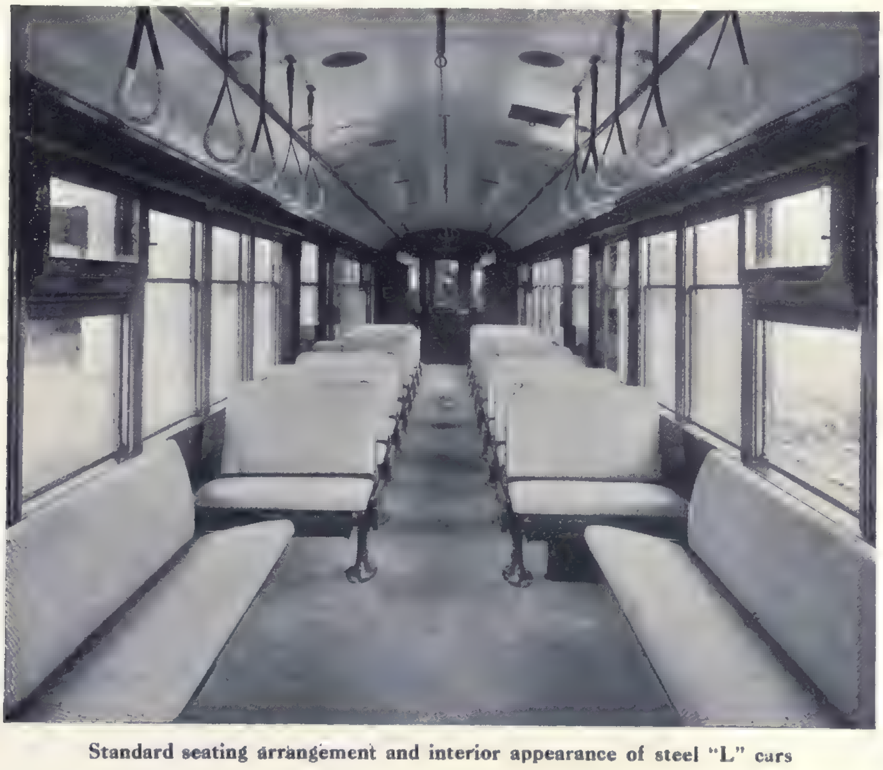


Type of modern steel car now in use on Chicago Elevated Railroad

general step in advance was to build a fully inclosed car with the car body and the vestibule together, omitting the bulkhead. At each of the four corners of the car there was installed a door sliding back into a door pocket and controlled with an air engine. The width of this door was slightly increased, changing the door opening from 26 in. and 28 in. to 36 in.

The next cars maintained this same general type of construction, except that the width of the four sliding doors was increased from 36 in. to approximately 48 in. This was the arrangement of doors when the first steel cars were designed in 1913. At that time it was anticipated that there might soon be a subway in the city of Chicago, and in that case very heavy passenger loads would be concentrated at a few stations. The steel cars were designed to be suitable for the proposed subway operation, and accordingly were provided with sliding doors at the center of the car as well as at each end, making three doors on each side of the car instead of two. The width of the center door was maintained at 48 in. and the width of the four end doors was reduced from 48 in. to 44 in. These cars were equipped with longitudinal seats, as it was considered that the center doors would soon be put in operation.

A year later an additional number of these steel cars were put in service, built on the same plans with the center door installed, except that reversible Walk-Over seats were installed at the center portion of the car with longitudinal seats at the four corners. As the center doors had not been used in any of the steel cars and as the tendency in the city of Chicago was to change from longitudinal seats to cross-seats it was necessary to install the Walk-Over seats in the second lot of steel cars to meet the wishes of the public. We still thought, however, that the center doors would some day be used, and so the doors were installed in the sides of the cars with the understanding that when they were placed in operation the cross-seats set in front of them would be removed and longitudinal seats substituted.



Standard seating arrangement and interior appearance of steel "L" cars

During the last few years the traction situation in Chicago has developed along lines which indicate that center side doors in the elevated cars will not be needed for a good many years, and as the public much prefers the cross-seats to the longitudinal seats, and as the installation of these seats across the center door does not afford the same comfort and convenience to the passengers that the seat installed opposite the regular car window affords, the management decided that on the 100 new elevated cars which are now under construction the center doors would be omitted. The steel framing of the car, however, has been designed in such a manner that center doors may be installed at a later date at a minimum cost.

PROGRESS IN SEAT ARRANGEMENT

The original coaches placed in service on the elevated roads had four stationary cross-seats at the center of the car with longitudinal seats throughout the remainder of the car. This seating arrangement was maintained in the coaches for a good many years. When electrically operated motor cars were first installed, they were equipped with longitudinal seats throughout. This condition existed a good many years until finally all motor cars were equipped with the four stationary cross-seats at the center of the car and longitudinal seats for the remainder, the same as the original coaches. This arrangement was maintained until the sentiment for the cross-seats became so strong in Chicago that these were installed on all new equipment. A short longitudinal seat at each of the four corners of the car is used with the cross-seats to provide a well near the end doors of the car. With the exception of the return to the longitudinal seats on account of the center doors installed in the first steel cars built in 1914, the plan has been to install all cross-seats in all cars. Seven reversible seats were first placed on each side of the car, then eight, and in the new cars now being constructed there will be nine.

From the commencement of the elevated roads down to the present time it has been the general practice to use canvas-lined rattan as upholstering material for all seats. The seats for the new cars, however, will be upholstered with green plush of the best grade. This step is being taken to please the passengers, as plush upholstered seats are more comfortable and have the appearance of greater luxuriousness.

CAR FRAMING AND FLOORING

The original cars on the elevated roads were built entirely of wood. The next step was to introduce a partial steel subframe in addition to the wooden subframe. This was followed by cars built with steel subframes and steel and wood cars were introduced in the elevated service. The cars which are at present on order will be of all steel design with several modifications over the cars built in 1914 and 1915. For instance, a double wooden floor will be installed instead of the composition floor used in the earlier steel cars. The wooden floor is warmer and has a much longer life than the composition floor. A great deal of complaint has been received from patrons, since the original steel cars were placed in service, on account of the coldness of the composition floors. Although these cars are the best heated cars on the system we are unable to keep the floors warm and it has been necessary to install leather floor mats during the midwinter months. The wood floors will overcome this criticism as well as last longer and be cheaper to maintain. The wood floor has been fireproofed by the installation of a sheet steel subfloor as part of the steel underframe of the car.

The first steel cars were equipped with steel roofs, and these cars have been operated only on tracks where third rail was installed. But the new cars will be operated partially over tracks where overhead trolley wire is installed. Hence it will be necessary to equip them with overhead trolley devices as well as third rail devices. As serious consequences might result from a trolley wire falling upon the steel roof of the passenger car, it was thought advisable to protect the roof against this contingency. It was decided to install a wood and canvas roof which would provide the proper insulation. Steel carlines and steel headlining will be installed and connected to the steel side structure of the car so that the interior of the car will be fireproof from without.

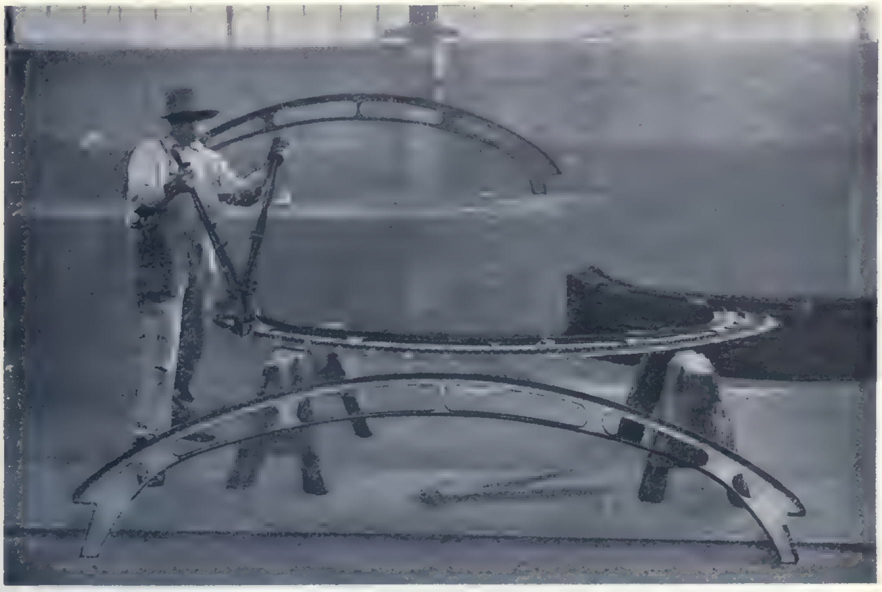
The underframing and steel under-floor of Chicago Elevated steel cars

On the first lot of steel cars the entire interior finish was made up of steel or Agasote. The cars which are now being built will be trimmed with steel, Agasote, and, in some places, mahogany. The mahogany will be used for arm rests, post covers and in a few other places which come into more general view of the passengers. It is considered that mahogany will present a better finish and a more pleasing appearance to the passenger than the steel and Agasote, the idea being to produce the most attractive car possible as one step in merchandising the service.

MOTOR AND TRAILER PRACTICE LARGELY FOLLOWED

The original motive equipment on the elevated roads consisted of steam locomotives hauling a number of trail coaches. After these steam locomotives had been in service for a few years on the South Side and Oak Park roads the Metropolitan Elevated was constructed and started in operation with electrically operated motor cars used as locomotives to haul one, two, three and four coaches. A few years later the steam locomotives on the South Side Elevated were abandoned and multiple-unit motor cars substituted.

The next step was to install multiple-unit control equipment on


Pressed steel carlines for arch-roof steel "L" cars

all of the roads. The South Side still maintains all motor cars while the other roads equipped their motor cars with large motors and operate trains composed of motor cars and trailers. The tendency has been to maintain a train make-up of motor cars and coaches, with the motor cars equipped with two motors of approximately 165-hp. capacity. As there have been more coaches in service than there were motor cars, the tendency is also to increase the number of motor cars so as to increase the motor capacity per train, which will result in faster acceleration and better schedule speeds. Accordingly the new cars which are now under construction will be motor cars.

TRUCKS IMPROVED FOR RIDING QUALITIES AND WEAR

The construction of trucks as used on the elevated cars has been considerably improved from time to time. This has been done mostly by making a close study of all parts which have caused failure or have rapidly worn, to terminate the cause and make such changes or redesign the parts in such a manner that the failure or rapid wear would be eliminated. By improving one detail after another the trucks as now used have been developed to the highest point of reliability. They are entirely free from trouble outside of the replacement of usual wearing parts. All of these wearing parts have been equipped with case hardened wearing shims to reduce the wear to a minimum, and these shims are installed in such a manner that when they do require renewal they can be changed with a minimum amount of labor and time. Although considerable attention has been given in years past to the spring arrangement and riding quality of the trucks under our elevated cars, no particular advancement had been made on account of the limited space for springs, occasioned by structure clearances and the size of the motors installed in the trucks. The trucks for the new cars which are now being built, however, have been redesigned to make more room for the springs so that more flexibility can be provided. The whole spring arrangement on these new trucks will be approximately 10 per cent more flexible than the springs on previous trucks. This will make them easier riding and more comfortable for passengers.

The first cars on the elevated system were equipped with straight air brakes. From that time we have progressed with the general advancement in the art and installed quick-action automatic brakes, then quick-action graduated release automatic brakes, and finally, the universal type of air brake.

For years the mechanical department of the elevated roads of Chicago has devoted a large proportion of its time to the details of equipment failure which caused delays on the road, necessitated sending cars to the shop and required the replacement or renewal of parts. In the case of any part which was giving an undue amount of trouble, whether it was a spring in the door latch, a bolt in the motor frame, or some part of the control equipment, a careful study has been made to find out how to increase the life of that particular part, or eliminate it entirely by redesigning a new part. In many cases a better grade of material has solved the problem. In other cases the parts have been redesigned or reconstructed, or the wiring of some piece of electrical apparatus changed, or the part eliminated entirely.

During the last few years one after another of these troublesome details have been corrected and all during this time the reliability of the equipment has been steadily improved. All such changes which have been found necessary have been incorporated in any new equipment which was purchased. This has applied to all parts of the equipment whether it be control equipment, motors, trucks, air brake or car-body parts.

By the time the steel cars were designed and built in 1914 and 1915, so many of these detail troubles had been overcome, and the design of the various parts of these cars relating to each other was so carefully gone into that when the cars were received they went into operation and performed in regular service without any difficulty whatever. It was not necessary to put them through a period of breaking-in, as is often done.

During the seven or eight years that they have been in service the results have fully met all expectations. The car-mileage per delay on these steel cars is several times as much as the car-miles per delay on the old types of equipment. However, such troubles and conditions as have developed on these cars in service will be corrected in connection with the cars now being built, so that as far as reliability is concerned the new cars should be even better.

Maintaining the Chicago "L" Structure

By G. M. ANDERSEN
Engineer Structures and Buildings
Chicago Elevated Railroads

THE oldest structure of the elevated railroads in Chicago was built some thirty years ago of wrought iron. The later structure was built of low carbon structural steel. The structure is inspected twice a year and records of these inspections are kept on a form sheet. These inspections are made by a structural iron worker and an assistant and are very thorough. All defects, such as loose rivets, etc., are recorded and are followed up and repairs made by the structural iron gang. It is interesting to note that wrought iron has much greater resistance against corrosion than structural steel. Wrought iron in this respect acts very much like copper bearing steel; it rusts on the surface but does not pit.

The painting of our structures is done on a seven-year program. It has been found that seven years is the maximum protection we can get in this climate with a good grade of paint. This does not, however, apply to locations where the structure is subjected to unusual conditions, such as gases, etc., where it is necessary to do painting every two or three years. Tests are carried on in these bad locations in order to determine the merit of paints. The painting work is generally done by our own forces, although some of it is let out by contract. The standard paint used on our structures is made up from our own specifications and consists of two parts of Double Label Prince's Metallic, one part red lead and one part graphite. This pigment is ground in 25 per cent of its own weight in raw linseed oil and then reduced with linseed oil to a liquid consistency, weighing 13 lb. per gal.

Many of our structures run over alleys or back streets. These alleys are also used or rather mis-used by the neighbors as dumps for ashes and garbage. Consequently the surface of the alleys grows higher and covers our column bases. To protect these column bases has been quite a problem, but this trouble has been successfully overcome by covering the column bases with concrete 1 or 2 ft. above the foundations. This concrete is built directly on the column base and in this way moves with the column and is really a part of it. A slight movement in the column will thus not crack the concrete. Light woven wire reinforcement against cracking is also used.

The present-day designer of an elevated structure can obtain valuable information by a study of existing structures. Ample and proportionate strength, ease of manufacture, ease of erection and cost are the main features to be considered. The very important item of maintenance was given very little thought in connection with the design of present structures. My advice to designers is to keep clearly in mind that ultimate cost is more important than first cost.

Signaling Trains on Chicago Elevated Railroads

By J. W. STEPHENSON
Signal Engineer
Chicago Elevated Railroads

SOME of the most recent developments in connection with the protection of train movements on the Chicago Elevated Railroads are the installations at bridges. The signal systems on the new Wells Street Bridge and the Lake Street Bridge are practically identical. These are the result of experience extending over a period of years. The old drawbridges were replaced by modern double-deck trunnion bascule-type bridges. It was found possible to eliminate one tower and operate both sides of the interlocking from one shore, effecting a saving of one towerman. This is done by controlling the far side through a submarine cable and by the use of track circuits. The plant is electro-pneumatic throughout. Alternating current is used to eliminate interference by d.c. propulsion return. In addition to the automatic stop at home signals, a diverting or bumping post switch has been added to insure a stop in case a motorman runs by the home signal.

A special feature developed for these bridges is the circuit control contact boxes which insure that all railbreaks are in place and properly aligned. Should any railbreak be out of line the contactor remains open and the indicator relay in front of the towerman will not clear. Neither will it give current to release the master control lever in the machine, which in turn will not give power to operate the bridge locks and motors. In other words, the control, locking and signaling of the bridge are all interlocked and backlocked so that the operator cannot make false moves. Everything must be done in sequence and all apparatus must be in proper place.

BLOCK SIGNAL SYSTEM BEING SYSTEMATICALLY EXTENDED

There are of necessity many curves on the elevated railroads. These are being protected according to a fixed program by means of three-position color light signals. Alternating-current single-rail track circuits are in use, and have proved highly successful. When a curve is to be protected, a speed-time curve is made up to suit the headway of trains, and the speed allowed over a given curve. Allowance is made for growth of traffic. When signal locations are made, taking into consideration braking distance and motorman's view, the general superintendent checks the locations, giving the signal engineer the benefit of years of experience on the front end of trains. Thus the installation may be classified as "tailor made" rather than "ready made."

The busiest railroad crossing in the world is at the intersection of the Chicago Elevated Railroads at Lake and Wells Streets. In the hour of maximum travel on the elevated, 218 trains comprising 1,100 cars pass this corner, or at the rate of 3.6 trains per minute averaging five cars per train.

METHODS OF INSPECTION FOLLOWED

In making new signal installations, brackets for signals are set in place, track bonding, alternating-current leads and meters are installed, and signals, relays, wiring and housings placed by the signalmen. All work is so co-ordinated that when tests are made and approved, the transportation department immediately gets out its bulletin and within the next twenty-four hours the signals are in service and the investment is making money for the company, not only by protection of trains, but in added track capacity.

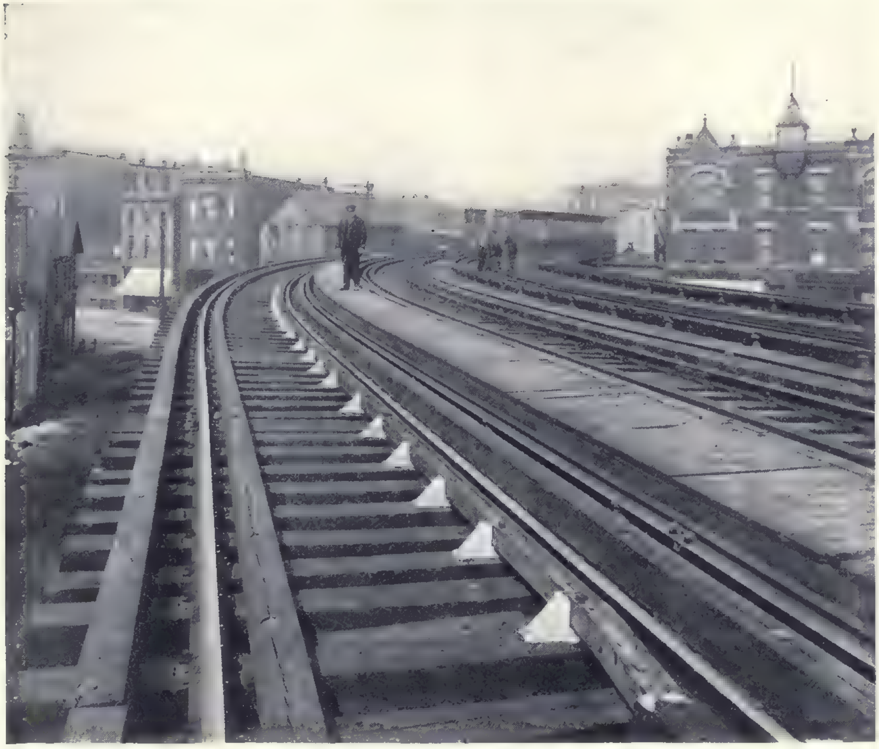
The main object of inspection is to catch trouble before it happens. First of all, we depend upon the signal maintainer, who is closer to his plant than any one else. A weekly interlocking inspection report is filled out by him every Saturday and sent to the signal foreman. Each month the signal foreman and track foreman make a joint inspection of interlock plants and insulated rail joints. A written report goes to the engineer maintenance of way.

Twice a year, in the spring and fall, the signal supervisor makes a detailed inspection of all interlocking plants and block signals. His report is made to the engineer of maintenance of way, with copies to the signal engineer and general foreman of the respective roads. The general foreman turns over the findings to his signal foreman, and he in turn to his maintainers, who correct defects and carry out recommendations, reporting back when completed. Then all reports are collected and sent back to the engineer of maintenance of way, where they are checked and filed for reference on the next seasonal inspection. This entails considerable work, but recurrent troubles are kept at a minimum and the failures as plotted show a steady decrease.

All failures are thoroughly investigated. No unsolved mysteries are allowed to stand, as it has been our experience that there is a determinable cause for all failures.

How "L" Track Is Built to Handle 900,000 Cars a Year

By H. P. SAVAGE
Track Engineer
Chicago Elevated Railroads



New type guard rail on Chicago Elevated curve in the foreground with old type in the background

THE problems of maintaining the tracks on a system of this kind are many. Probably the greatest problem is to get special work and rail of a suitable nature to withstand the great frequency of train operation. The 4.72 miles comprising the Union Loop is divided into 2.36 miles of track known as the Inner Loop and 2.36 miles of track known as the Outer Loop. Over each of these two tracks during the course of one year, 900,000 cars pass. Originally the track construction on the Loop was the same as elsewhere on the elevated lines—No. 1 yellow pine ties placed at 18-in. centers with 80-lb., 33-ft. open-hearth A.S.C.E. rail. This was changed about 1911. The ties were placed much closer together, the centers being 11 in. instead of 18 in., making almost a solid bed of ties. The rails were replaced with 60-ft., 90-lb. high-carbon open-hearth rail. The special work, that is, the frogs and switches, were all changed to 90-lb. rolled manganese rail with heavily sideguarded switches. With this new construction the life of the track has considerably lengthened, and the life of the switches has been increased from ninety days to two and a half years.

On the lines adjacent to the Loop where the volume of traffic is also very heavy, it has been necessary to rearrange our standards and use 90-lb. high-carbon open-hearth rail, A.S.C.E. section, larger tie plates beveled one in forty, apply anchors in the center of each rail, use high-carbon heat-treated angle bars with heat-treated track bolts, and joint screw spikes to hold the rail from creeping or minimize creepage. We have 947 switches and eighty crossings, and 20.62 miles of the total 190.03 miles is curved.

The ties used on the elevated structure are 90 per cent heart, or better, long-leaf yellow pine. These are untreated, as we find that they wear out by abrasion before they rot. The life of the ties is from fifteen to eighteen years on tangent and twelve to fifteen years on curve track, depending largely on traffic. We use white oak and treated red oak ties on surface tracks.

We use a high-carbon 90-lb. rail on tangent and on long, radius curves. This was found necessary on account of the frequency of traffic which will rapidly cold roll an ordinary open-hearth rail. The carbon runs from 0.75 per cent to 0.88 per cent. Rail on tangent lasts about fifteen to eighteen years, depending on traffic. It fails by the joints cupping. In many cases we have taken out rail, sawed a foot off each end and relaid. This can be done for about half the cost of new rail. On curves of shorter radius we use rolled manganese, as we have found it to outlast the open hearth by about 8 to 1. Rails fail on curves due to corrugation.

MILEAGE OF CHICAGO ELEVATED SYSTEM

Road	Elevated	Surface	Total
Metropolitan	43.04	11.70	54.74
Northwestern	47.39	14.22	61.61
South Side	42.49	3.81	46.30
Oak Park	16.30	6.36	22.66
Union Loop	4.72	.....	4.72
Totals	153.94	36.09	190.03

All curves are measured and made up by a special gang of five men, which has its headquarters and equipment at one of the yards. The equipment consists of a big bulldozer strong enough to bend a 100-lb. rail head on, drill presses, rail punches, rail saws and overhead carriers.

Footwalk renewals are made up in 16-ft. and 18-ft. sections in the yards and are placed with a derrick car.

When tie renewal becomes necessary at any point, the deck is renewed completely for long stretches; that is, there is no spotting of ties or patching, as we have found that this gives a very bad track on account of uneven bearing. Ties are not countersunk for rivets but are allowed to set down from the weight of the trains. Electric tools for boring are used extensively. Countersunk holes in guard rail are filled with mastic asphalt. Renewals of deck are made under traffic on six-minute intervals. Closer interval track is cut out.

Curved rail is laid with traffic cut out. Tangent rail is hooked up in long stretches and thrown in with traffic cut out. All track is patrolled once a day by section men. Curves are greased with heavy graphite grease as frequently as needed.

We have found that wooden plank will not stand up under the heavy traffic that we get at our surface crossings and are therefore using Tarvia, concrete and concrete plank with good success.

Utility Insurance an Exacting Science Now-a-Days

By WILLISTON FISH
General Manager Chicago Surface Lines

Providing full protection with the lowest possible expenditure requires systematic and experienced handling. The system in use by the Chicago Surface Lines and the reasoning which lies behind it are succinctly and interestingly told

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IN THE good old days any man by demonstrating — fully — that he was good for nothing else was held to have demonstrated—fully—that he was born for the insurance business, and when, thereupon, he got in some blank policies and put out a sign he became an ordained insurance agent, and any property owner who was a personal friend of his would immediately and naturally rely upon him implicitly, in insurance matters, for advice and guidance.

Certainly it was a happy time when no man needed to be disheartened by failures in business or by being derailed in his chosen lifework, understanding that when his failures were sufficiently numerous and complete he would be ready to act as a trusted counselor in every branch of insurance, and grab off the regular commissions, do well and be highly regarded in the community.

And the old times were happy times not only for the insurance broker but also for the public utility manager, who then could "give the insurance" to his personal friends and be a tremendously good fellow, or "divide the insurance" among the agents in the territory and be a tremendously politic fellow. This satisfaction of the management was supposed to be gained without any cost, it being assumed that insurance agents had no other function than to sign policies and collect commissions, and that when once signed one policy cost no more and no less than another and served the purpose no better and no worse.

Simple, happy Arcadian days—sometimes, of course, sadly interrupted by discovery that a public utility company had been wasting money for years by paying premiums on account of hazards that could have been cheaply eliminated, or more sadly interrupted, after fires, by the shocking discovery that values had not been properly estimated or that they had materially changed or that the insurance form had not been properly drawn or that guaranties had not been kept or that responsible insurance companies had not been chosen. But on the whole, simple, happy Arcadian days.

However, they are days that are gone. Various causes have combined to bring about a radical change in the whole attitude of public utilities toward insurance. Some of these causes are indicated below:

WHY UTILITY INTEREST IN INSURANCE IS INCREASING

1. The utility properties have greatly increased in size and importance, and each department of the business receives closer and better attention. A large utility company's insurance is no longer held in the hands of the head men as a mere matter of patronage, nor is it turned over to the least occupied clerk as mere matter of form and record.

2. Utility rates are made by commissions, and it is understood that fair rates include the reasonable cost to a utility of full insurance protection.

3. As a development beginning about 1900 there has been an enormous advance in the art and practice of valuation so that there has come to be a far better understanding by the management of utilities of the values of the various items of their properties.

4. Since 1914 the great and rapid rise in cost of labor and material has roused companies to inquire more carefully and more frequently into their insurance valuations, and at the same time the increasing premiums based on increased valuations have led managements to inquire how rates may be reduced.

5. A shortage of plant and equipment to meet increasing demands of service has led managements to study fire protection and fire insurance.

6. The increased care of trustees under utility mortgages to see that the provisions of mortgages include ample insurance protection, and that these provisions are carried out, has been an important factor in bringing about an improved insurance situation.

7. Especially there has grown up, with the rapidly increasing operating factor, a vivid realization of the need of care and economy in the administration of each department of each public utility.

8. During a course of years, beginning perhaps around 1900, insurance brokerage concerns have been very highly developed so that they have become capable of giving the wider, wiser, fuller and more scientific service and the all-the-year-around service that the magnitude of the property interests involved and the demands of modern management have gradually come to require.

The *Electric Railway Journal*, understanding the great and growing importance of the modern subject of insurance, wished to give space to the matter in its Convention Number, and out of courtesy it has asked the Chicago Surface Lines, as one of the representative members of the association in the convention city, to furnish a statement setting forth the manner in which its insurance is now handled. The Surface Lines is very willing to furnish the statement, but of course with the understanding that it is speaking only among friends and fellow members of the association and is not attempting to pose as an instructor or as an authority or guide in insurance.

HOW CHICAGO COMPANY FOLLOWS INSURANCE DETAIL

The Surface Lines plan of caring for insurance and fire protection—two matters which are inseparable—includes the following:

1. A detail inventory and valuation is made of all insurable property. The valuation is based on present reproduction cost new, with depreciation therefrom figured on sinking fund basis. From the detail inventory and valuation there is made up an abridged volume which shows each separate insurance risk with reproduction cost new and depreciated values of the main items making up the risk. The figures for non-insurables are shown and deducted. A copy of this volume is furnished to our general insurance agents.

Redeterminations of insurable values are made each insurance year, or oftener, when necessary to meet changes in base costs.

2. The general insurance agents cause to be made up by their insurance engineers a complete insurance survey and report of all buildings, yards and insurance locations. The report gives a plat, description and study of each separately rated risk. Among other things, it shows the insured values at each such risk in building, contents and rolling stock, respectively; the make-up of the rate on the risk, the cost in premium due to each item of the rate, a discussion of the improvements that could be made in each separate risk, with resulting premium savings; suggestions for eliminating fire dangers or providing for better protection against fire in cases in which rate and premium are not affected.

3. The Surface Lines departments concerned are furnished with copies of the insurance survey and report. These departments make studies and estimates to determine what improvements among those suggested are feasible, the best way of carrying them out and the probable cost. Each case is then considered and decided—the estimated cost of the improvement being set against the saving in premium, the lessening of fire risk, etc.

4. All of the Surface Lines properties are inspected regularly by experienced and capable insurance engineers furnished by our general insurance agents. Our own forces maintain a constant supervision over the risks to see that our guaranties are maintained, that fire-fighting apparatus is kept in place and in condition, that automatic doors are kept free and in operating order, that no new fire risks are introduced without authority, and generally that "good housekeeping" is maintained.

5. Designs for new buildings or for building changes are submitted to our general insurance agents for suggestions looking to maximum fire safety and minimum rates.

6. We have appointed Marsh & McLennan to be our general insurance agents and we have placed upon them, and in the regular course of their business they have assumed, full responsibility for all the above work except the making of inventory and valuation and the estimates of costs of improvements, and our own inspection.

SOME OF THE COMPANY PRACTICES IN FIRE PROTECTION

Nearly all our carhouses are fireproof or fire-resistive construction. We have several operating car storage yards with bays divided by fire walls. Our aim is to give bays in carhouses and yards a maximum trackage of 1,500 or 1,600 ft. so as to limit the loss of rolling stock in case of a fire to the equivalent of about thirty double-truck cars.

All our properties of any size are equipped with central station watchman service, standpipes and hose, barrels of water and buckets, sand pails and chemical extinguishers. Fire apparatus is painted red.

Our men are drilled at short intervals in fire fighting. Call to drill is by gong sounded at any time night or day. On the sounding of the alarm all the men at the car station or shop accustomed to handling cars hasten to move the cars out and to a proper distance away. The rest of the men run to their places to make use of the fire-fighting apparatus. In case of actual fire the first man to discover it turns in the alarm for the public fire department and then the call for the company brigade. At all locations Chicago fire alarm boxes are close by. For a considerable time past the calls of our employees in cases of actual fire and the responses of the Chicago Fire Department have been almost or altogether perfect.

In the construction of our cars we require that the wiring and the car heaters be installed according to the National Electrical Code. At car stations we allow smoking in crew rooms only. We have the hearty co-operation of trainmen and other employees in the work of good housekeeping and safeguarding the properties against fire. Our stations designed since 1907 afford track facilities for getting out rolling stock in case of fire. Where practicable the bays are double-end.

The average total cost of heating the cars of the Chicago elevated railroads is $166,800 per year. The energy consumed in heating is 10.65 per cent of the total energy used by the system.

CONSTANT ATTENTION NEEDED TO KEEP UTILITY PROPERLY INSURED

Our total fire insurance is now something over $55,000,000, nearly all of which is carried on one general blanket form with a 100 per cent co-insurance clause. This form is of course carefully drawn under the advice of our general insurance agents, with the approval of the legal department and of other departments of the Surface Lines that are concerned.

We understand that fire insurance is a science; that it consists of many items, none of which may be overlooked without penalty great or small. We give constant attention to our insurance ourselves, but we demand and obtain from our general agents unlimited, all-the-year-around service. We feel that our insurance is safe. We feel that we are getting good results in (1) reduction of rates and (2) protection of our income by minimizing fire risks. During the last twelve months, with the services of our agents and under the plan above outlined, an annual premium reduction of over $50,000 was effected, and other improvements suggested in the survey and report of the agents will give us a considerable further reduction. The cost of the improvements necessary to secure these reductions will hardly exceed the premium savings for one or two years.

It is to be expected that the importance of the subject of insurance of various kinds, and the attention that public utilities are now giving it, will effect highly valuable improvements in general and also in detail.

But of course the old, simple, happy Arcadian days are gone.

Systems and equipment used in Chicago were determined upon only after extended study and tests, the results of which are here presented for the first time, together with the experience in various phases of this perplexing problem

Heating and Ventilating Chicago Street Cars

By CHARLES GORDON
Engineer of Equipment
Chicago Surface Lines

Standard exhaust and intake automatic ventilator installation as installed on monitor deck Chicago car

THE subject of heating and ventilating of street cars has become an increasingly important problem to the managements of electric railway properties as the industry has progressed. At one time a layer of straw on the car floor was considered a satisfactory provision for the comfort of urban passengers. The introduction of stoves represented the first serious attempt at providing artificial heat, while ventilation was obtained through the deck sash provided in the deck roof construction. This was carried over into street car design from coach practice.

The necessity for more scientific methods of ventilation has been a development incident to the demand for better heated cars. Before the advent of the inclosed vestibule, car heating practice, although it had developed to the stage of providing a source of heat within the car, did not even attempt to maintain any given temperature. So much cold air was admitted around doors and crevices that there was no particular demand for ventilation. Deck sash were provided which could be opened when the car became "stuffy" due to rising outdoor temperature or an extremely crowded condition.

With the advent of the inclosed vestibule and the demand for better heating facilities and higher car temperatures, the problem of ventilation, considered from the standpoint of passenger comfort, may be said to have really taken concrete form. The two subjects are inseparably associated and are both of importance only in the winter when the windows are closed and the heat turned on.

PROBLEMS OF VENTILATION PHYSICAL RATHER THAN CHEMICAL

Before proceeding to a description of a number of the studies which have been made in Chicago, it may be well to summarize briefly some of the general principles connected with the subject, upon which there was for many years a general misconception among those generally regarded as authorities, and there still is in the popular mind.

After a great deal of exhaustive research on the part of many investigators, it is now generally agreed that the problems of ventilation are essentially physical rather than chemical. In attempting to provide for the comfort of passengers in a street car, therefore, through the design of a system of ventilation, it must be borne in mind that the feeling of comfort engendered by the quality which is generally referred to as "freshness" in the air within the car results from the physical contact of the air with the skin and the psychological reaction from the effect on the sense of smell, rather than from any chemical result through respiration.

Unless the air in contact with the skin is of proper temperature and humidity and is in a sufficient state of motion effectively to absorb the required heat and moisture from the body, the passenger will be uncomfortable regardless of the chemical purity of the air. Conversely, with the temperature, humidity and state of motion of the air properly controlled, a person may remain in an atmosphere containing a relatively large percentage of the products of respiration without feeling any discomfort whatever.

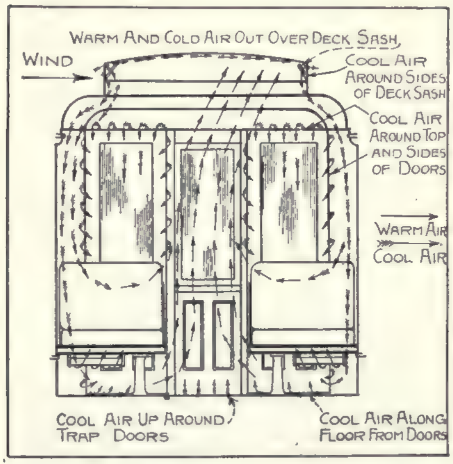
Warm And Cold Air Out Over Deck Sash
Wind
Cool Air Around Sides of Deck Sash
Cool Air Around Top and Sides of Doors
Warm Air
Cool Air
Cool Air Up Around Trap Doors
Cool Air Along Floor From Doors

Fig. 1—Monitor deck car, deck sash open, cross wind blowing.

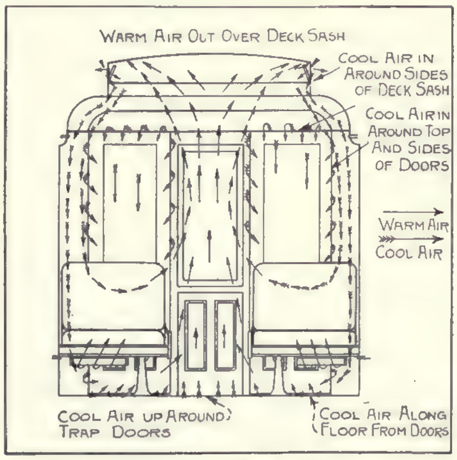
Warm Air Out Over Deck Sash
Cool Air in Around Sides of Deck Sash
Cool Air in Around Top And Sides of Doors
Warm Air
Cool Air
Cool Air up Around Trap Doors
Cool Air Along Floor From Doors

Fig. 2—Same as Fig. 1, but no cross wind.

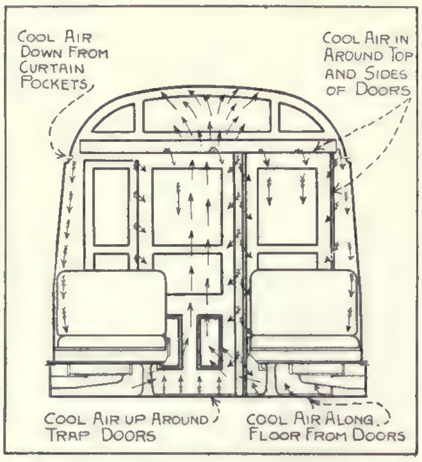
Cool Air Down From Curtain Pockets
Cool Air in Around Top and Sides of Doors
Cool Air up Around Trap Doors
Cool Air Along Floor From Doors

Fig. 3—Arch roof car with exhaust fan ventilation, no wind.

Air circulation in cars standing with electric heaters on

These facts have been amply demonstrated by many investigators. The early theories which assumed that ventilation systems should be designed for the purpose of eliminating the so-called harmful and poisonous products of respiration have been ably and conclusively disproved. Although the carbon dioxide content of occupied spaces is still used as an index of the quantity of air supplied to the breathing zone, it is in itself no longer considered a harmful ingredient of the air, even when present in quantities far in excess of that obtained in crowded spaces where little air supply is provided.

In attempting to provide a satisfactory combination of heating and ventilating, the car designer and operator, working under the general misconception of the subject, were faced until comparatively recent years with an almost impossible combination of requirements. The entire efficacy of the ventilating system was judged on the basis of volume of air admitted to or extracted from the car, and the success of the heating system was judged on its ability to maintain a given minimum temperature without regard for limitation against excessively high temperature. Where electric heaters were used this practice resulted in a needless waste of heating energy. In addition, when sufficient heating capacity was installed to maintain a comfortable temperature in severe weather, a moderate day would produce extremely "stuffy" cars, which seemed to require larger volumes of "fresh" air to be provided by the ventilating system. Where an attempt was made to avoid needless waste of heating energy by providing heater capacity suitable for average temperature conditions only, an unusual cold spell would result in poorly heated cars. By providing means for automatically controlling the car temperature, by giving more attention to the methods of producing the required air interchange so as to give a degree of dilution which would rapidly dispel odor and at the same time create a condition of motion of the air within the car without producing objectionable drafts, and by introducing and diffusing sufficient quantities of "fresh" air at a point near the roof in such a way as to give the stimulus of cool air in contact with the skin, a great deal of progress has been made in perfecting a combination of satisfactory apparatus for heating and ventilating of street cars.

The above résumé of the underlying principles involved is presented not so much for the purpose of reviewing the subject, but for the purpose of outlining the point of view from which the task of properly heating and ventilating street cars in Chicago has been approached.

REQUIREMENTS SET UP FOR CHICAGO COMPANIES

The ordinances of the city of Chicago contain the following requirements relative to the heating and ventilating of cars:

> A minimum temperature of 50 deg. F. above zero shall be maintained in all cars in service carrying passengers when the outside temperature is at 10 deg. F. above zero or higher.
>
> A minimum temperature of 45 deg. F. above zero shall be maintained in all cars in service carrying passengers when the outside temperature is below 10 deg. but not below 5 deg. F. above zero.
>
> When the outside temperature is below 5 deg. F. above zero, the temperature in all cars in service carrying passengers shall be maintained at 45 deg. F. above zero, or as near this point as the continuous operation of all the heaters in said car to their full capacity will allow.
>
> There shall be maintained and conspicuously displayed in such car a standard Fahrenheit thermometer so located that it will furnish a fair criterion of the temperature of the car.
>
> The air shall be supplied in such quantity that the amount of carbon dioxide present in the air of the said car shall not exceed twelve parts in each 10,000 parts of air.

Electric heaters became standard equipment on all surface cars in Chicago during the rehabilitation of the property after 1907. Their use was dictated primarily by their cleanliness and the resulting reduction of fire risk. Ventilation at this time was entirely by the use of deck sash. On some of the first groups of cars constructed during the rehabilitation period, a simple type of intake was installed in the front deck opening, arranged with deflectors to exclude weather and registers on the interior of the car to regulate the quantity of air admitted. This was a long step in advance, but in service these intakes were generally kept closed because they produced objectionable drafts when the car was operating at full speed.

Tests of various forms of ventilating devices were conducted from time to time, beginning about 1908 and extending through 1909, by the engineers of the street railway companies, co-operating with the Board of Health of Chicago and the Board of Supervising Engineers. These tests were carried out upon various types of "natural exhaust" ventilators installed in the monitor decks, with openings for intakes arranged in various ways, usually in the floor of the car, and designed to supply outside air in proportion to that eliminated through the ventilators.

The various ventilators were compared on the basis of the results obtained from anemometer readings taken at the exhaust openings. In the progressive study of this subject, tests were also conducted upon cars equipped with the "vacuum system" of ventilation, in which a duct was provided along the ceiling of the car opening through registers into the car body, and from which the air was exhausted through a blower fan placed in a housing on the hood and opening into the duct through the end of the deck.

Depending only upon the size and speed of the fan, the tests of this system showed it to be capable of circulating almost any quantity of air desired. A group of 350 monitor deck cars was therefore equipped by building a false ceiling in the deck to provide a duct, allowing the deck sash to be operable if they should be required.

Numerous tests showed that this system would exhaust considerably larger quantities of air than was possible with the best of the various forms of "natural exhaust" ventilators available up to this time. As the sole criterion of good ventilation at this period was generally considered to be the number of cubic feet of air exhausted per hour from the car, the railway companies in Chicago looked upon this arrangement as a means of providing the large volume of air exhaust desired and at the same time permitting the elimination of the heavy and expensive monitor deck through the use of the lighter and cheaper arch-roof construction for cars.

As a result of these conclusions, the next groups of cars built were of the arch-roof type and included the "vacuum system" of ventilation. In the early installations it was considered necessary to provide special intake openings for the admission of air to supply that exhausted by the fan system. These openings at first consisted simply of holes cut into the floor, usually under either the cross-seat or longitudinal seat heaters or both. These openings were later inclosed by ducts so as effectually to conduct the incoming air around the heater before it was admitted to the car. Experience with this arrangement soon demonstrated that an objectionable quantity of dust was drawn into the car, and later constructions provided for the admission of incoming air through louvers in the side of the car body between the sill and the belt rail. This arrangement was an improvement from the standpoint of eliminating excessive entry of street dust.

The "vacuum system" in service developed certain disadvantages, among the most important of which were the following: (1) High first cost; (2) noise; (3) necessity for maintenance of a motor-driven fan equipment; (4) necessity of supervision of operators to make sure ventilating fans were kept turned on; (5) large quantity of air exhausted when comparatively light passenger load is present in car, thus resulting in needless waste of heating energy.

Nevertheless, it was at this time the only practical method of obtaining the large volume of air interchange which was considered the primary requirement for satisfactory ventilation. In addition, it seemed to be the only means of providing any suitable ventilation with the desirable arch-roof construction.

Although up to this period many tests had been conducted on the monitor deck cars, in an attempt to find a better method of providing ventilation than that obtained by opening the deck sash, no system which would give a real improvement had been found. In the progress of these tests, a large number of readings on various cars in service during the rush hour were taken, both on cars equipped with ventilators and those equipped with deck sash only. The quantities of CO_2 obtained during these checks were not found excessive in the monitor deck cars without ventilators, when the deck sash were kept properly open, but these cars were generally unsatisfactory because of objectionable drafts produced in cold weather and the consequent difficulty in keeping the sash open.

The City Health Department co-operated with the engineers of the railway company and the Board of Supervising Engineers in a careful study of the subject, and it was finally decided that the results obtained with a properly designed natural exhaust ventilator would result in a sufficient improvement in the conditions to warrant the expense of installing ventilators of this type in all of the then existing monitor deck cars. During the progress of these investigations, Dr. E.

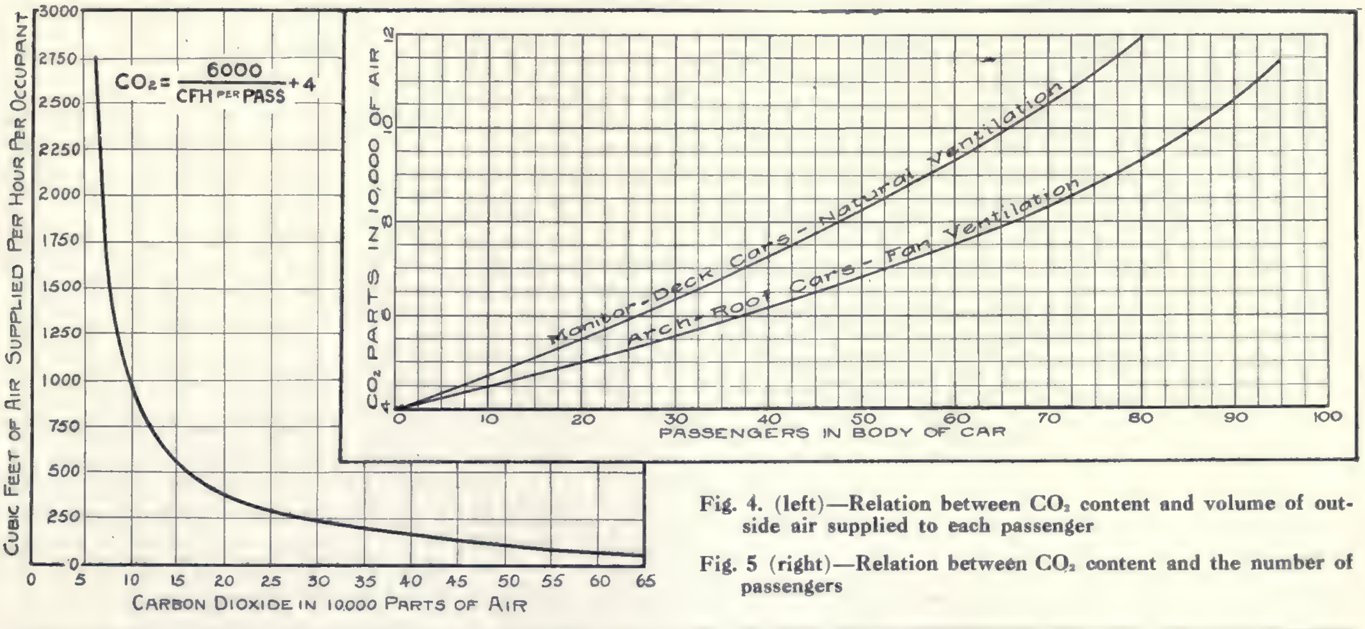

Fig. 4. (left)—Relation between CO_2 content and volume of outside air supplied to each passenger

Fig. 5 (right)—Relation between CO_2 content and the number of passengers

V. Hill, ventilating inspector in charge for the Department of Health, advocated the use of some form of intake in conjunction with the exhaust ventilators for the purpose of supplying a fixed or uniform quantity of cool air to the interior of the car, in such a way that this cool air would reach the breathing zone in sufficient quantities to give the feeling of "freshness" resulting from direct contact, and also would be at all time sufficiently limited in quantity to prevent objectionable drafts.

A compensating type of intake to be placed in the end deck opening was developed by one of the manufacturers. This device was arranged with a movable vane, which was designed to compensate for the car speed or for head winds by reducing the intake opening as the car increased in speed and enlarging this opening as the car slowed down. Deflectors were arranged so as to direct the incoming air toward the headlining of the car and allow it to descend to the breathing zone, without causing an objectionable draft. This arrangement was a considerable improvement in car ventilating apparatus.

The success attending the installation of this combined system of intake and exhaust ventilators to the monitor deck cars encouraged the development of ventilators of this type for application to arch-roof construction. This development has been successful and the ventilating equipment being installed on new cars of the Chicago Surface Lines is of this type. A compensating intake, similar in principle to that used for monitor deck cars, has been developed for the arch-roof construction, and as the system is being applied compensating intakes are installed at the four corners of the car body, with exhaust ventilators spaced on either side of the roof between the intakes. While the car is operating in a given direction, the two rear intakes usually function as exhausts. From the results obtained, it seems that the most serious objection to the arch-roof construction has been overcome.

During the progress of the various tests conducted and studies made in connection with this interesting subject, a large volume of data have been accumulated, some of which may be of general interest. An attempt will therefore be made to summarize some of the more interesting results and present typical sheets showing how the data of some of the tests were compiled, summarized and interpreted.

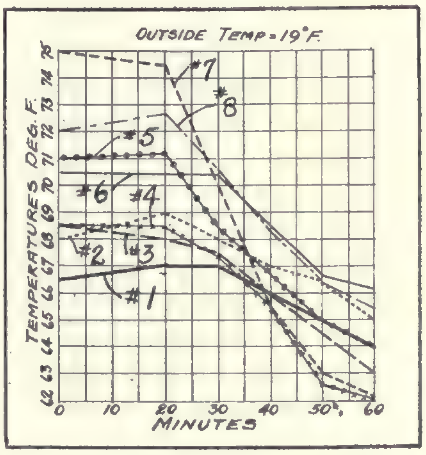

Fig. 6—Graph of temperature variations at locations indicated in Fig. 7; car outdoors, heat and ventilating fan on

CIRCULATION OF AIR IN MONITOR DECK AND ARCH-ROOF CARS

Figs. 1, 2 and 3 represent the paths of air curents in monitor deck and arch-roof cars, the results having been obtained by introducing smoke and white fumes to the interior so that the paths of the various air currents could be observed. Fig. 1 represents these currents in a monitor deck car standing in the open air with the deck sash open and heaters turned on, when a cross wind was blowing directly against the car side. It will be noted that a considerable part of the air entering directly over the sash on the windward side blows across the headlining and out on the other side. Some of this cold air, however, descends along the walls of the car to the floor, where it is caused to rise by the action of the heaters. Another portion of the entering cold air is caught in the rising stream of warm air before it reaches the floor.

On the opposite side of the car, a smaller quantity of cold air also enters through the open deck sash, particularly at the ends of the sash. It is these direct streams of cold air that produce the objectionable drafts that make ventilation through open-deck sash unsatisfactory. The main body of warm air rises through the center of the car, and in Fig. 1 is deflected to the side away from the wind, while in Fig. 2, it is exhausted on both sides, generally over the top of the deck sash. The smaller streams of cold air which enter around the car doors, trapdoors and other crevices are also indicated. The various streams are intermingled and considerably diffused, particularly when the car is in motion. In general, however, the main streams of cold air descend close to the walls and the warm air from the heaters rises at the center of the car.

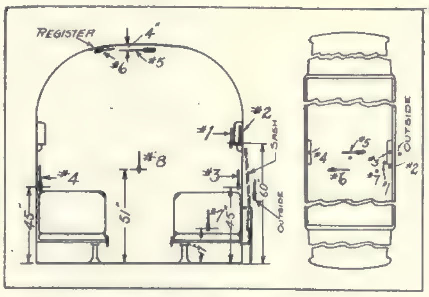

Fig. 7—Locations of thermometers for temperature readings of Fig. 6

In the arch-roof car with exhaust fan ventilation, the convection currents resulting from the action of the car heaters are aided by the action of the fan, while the cold air enters through the various cracks and crevices in a more diffused condition than that which enters through the deck sash openings in the case of the monitor deck car.

A study of these diagrams will indicate the importance of mounting heaters as close to the floor as practicable for the various types of heater construction available. The ideal method would be to mount the heaters in a position on or in the floor, so that passengers can place their feet directly on the heater. The adoption of this scheme of mounting will probably follow rapidly on the development of a suitable heater for the purpose. Such a heater would require ample provision against mechanical damage by passengers and damage from water during the process of car cleaning and in wet weather.

CARBON DIOXIDE CONTENT IN CARS

Measurement of the carbon dioxide content in the air of an inclosed space has been a common means for determining the effective air supply for ventilation. Contrary to previous theories, the carbon dioxide in itself is no longer considered a harmful ingredient, but forms a ready index for determining the efficacy of the ventilating equipment in maintaining a proper interchange or dilution of the air within the investigated space. Fig. 4 is a curve which is very useful in interpreting carbon dioxide readings. It is taken from a preliminary report of the street car committee of the Chicago Commission on Ventilation, and shows the number of cubic feet of outside air that is actually effective in producing dilution corresponding to various carbon dioxide determinations which in practice are obtained from samples taken from the air under investigation. This curve is based upon the formula:

$$CO_2 = \frac{6000}{\text{CFH per Pass.}} + 4$$

in which CO_2 represents the carbon dioxide content obtained in a sample of the air expressed in number of parts by volume in 10,000 parts of the sample. The term 4 represents the average carbon dioxide content in 10,000 parts of outside air under average conditions, and the factor 6,000 is based upon the production of 0.6 cu.ft. per hour of carbon dioxide by each occupant. CFH is an abbreviation for cubic feet per hour.

In practice the common method of making carbon dioxide determinations is to collect samples of the air in small sterilized bottles and to determine the carbon dioxide content of these samples by means of the Peterson-Palmquist apparatus. This aparatus, however, has several objections attached to its use.

A method of determining CO_2 developed by Professor McCormack of Armour Institute was used in a great many of the carbon dioxide determinations made by the railway companies, and was found to give consistent results and to be easily manipulated. The sample was obtained by pumping a given quantity of air from the car measured by means of a gas meter through a gas wash bottle containing a standardized barium hydroxide solution and then transporting the solution thus formed to the laboratory for analysis.

The curves shown in Fig. 5 represent an average of a great many observations made on both monitor deck cars with deck sash ventilation and arch-roof cars provided with exhaust fans. These curves represent the variation in the carbon dioxide content found with variable numbers of passengers in the car. In each observation, a complete record of all related data was made, and in a number of cases several determinations of carbon dioxide were made during a trip, in order to determine the maximum content which was reached at the point of heaviest congestion. The data recorded included the following items:

Date of test; car number; style of car (monitor deck or arch roof); route; direction of operation; location on trip; condition of ventilators (example, four deck sash open 4 in.); direction and velocity of wind; heater capacity in service; number of passengers in body and on platforms; time of taking sample; height above floor at which sample was taken; outside temperature; barometer reading; car temperature; quantity of air used for test, corrected for pressure and temperature; relative humidity.

Individual observations, of course, varied largely from the average curve shown. In each case these variations were due to factors which were indicated by the conditions observed at the time of making the test, and the curves presented represent the general average of the results.

TEMPERATURE AT VARIOUS LOCATIONS WITHIN CAR

In Fig. 6 are shown the results obtained from an investigation to determine the air temperature at various locations within an arch-roof car. The readings of temperature were taken with chemical thermometers mounted in locations as shown in the cross-section and plan sketch of the illustration. In these sketches the location of the thermometers is indicated by numbers which correspond with the numbers applied to the graphic record shown at the right. This graphic record shows the results of readings taken for an hour on the various thermometers after the car had been run outdoors with the heat and ventilating fan on full.

The primary purpose of this investigation of temperatures at various locations was to determine how fair an approximation of the average temperature of the air within the car body was given by the service thermometer mounted on the body sign box. In the diagrams No. 1 represents the car thermometer mounted on the body sign box. No. 2 represents a test thermometer suspended at the end of the sign box. No. 3 represents a thermometer suspended about 4 in. from the body side sash and 45 in. above the floor. No. 4 represents a similar thermometer placed in a similar location on the opposite side of the car. No. 5 was placed directly in the center of the car about 4 in. below the headlining, and No. 6 directly under one of the openings leading from the car body into the exhaust ventilating duct. No. 7 was placed over the center of a cross-seat cushion 17½ in. above the floor. As indicated by the graphic record of temperatures observed, there is a considerable variation for different locations. It will at once be noticed that as the sign box thermometer, from which all observations of temperatures of cars in service are made, is in the stream of descending cool air adjacent to the sides of the car, it is really in a very poor position to give a fair indication of the actual average car temperature. The difficulty of mounting a service thermometer in any better location, however, has made it impractical to improve on the condition.

A number of tests of this kind, all made with the same object in view, on various types of cars, including monitor deck as well as arch-roof construction, indicated in general the same results. Lack of space prevents including a great deal of interesting data which have been collected. It is apparent, however, that if it were possible to mount a thermometer in the locations shown for No. 8, an average indicated body temperature between 3 deg. and 5 deg. F. higher would result.

ALLOWANCE MUST BE MADE FOR LOCATION OF THERMOSTAT

Where thermostats are used for regulating car heaters, they are usually mounted either on the sign box or on a body side post, where the condition is even worse, as shown by the final temperatures obtained on thermometers 1, 3 and 4. This results in maintaining a temperature at location No. 8 anywhere from 3 to 5 deg. above that for which the thermostats are set and makes a considerable difference in the heat energy consumed. In calculations carried out to determine the effect of changing the thermostat setting 3 deg. under average winter conditions, it has been found that an increase in the thermostat setting from 52 deg. to 55 deg. or a difference of 3 deg. F. would result in a reduction in the saving made by the thermostat of approximately 15 per cent.

The experience of the surface lines in making a scientific determination of the proper heater capacity for various type cars, the study made of the radiation constant of cars under all the varying conditions, and the actual functioning and results of thermostatic control of heaters, are related in the remainder of this article, which will be published in next week's issue.

Developing Chicago's Street Cars

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The Good Features and Imperfect Points of the Successive Types of Cars Are Related—The Performance Experience, Coupled with Constant Engineering Study, Have Produced Many Changes—The Whys of These Are Told from the Experience of the Largest Street Railway System

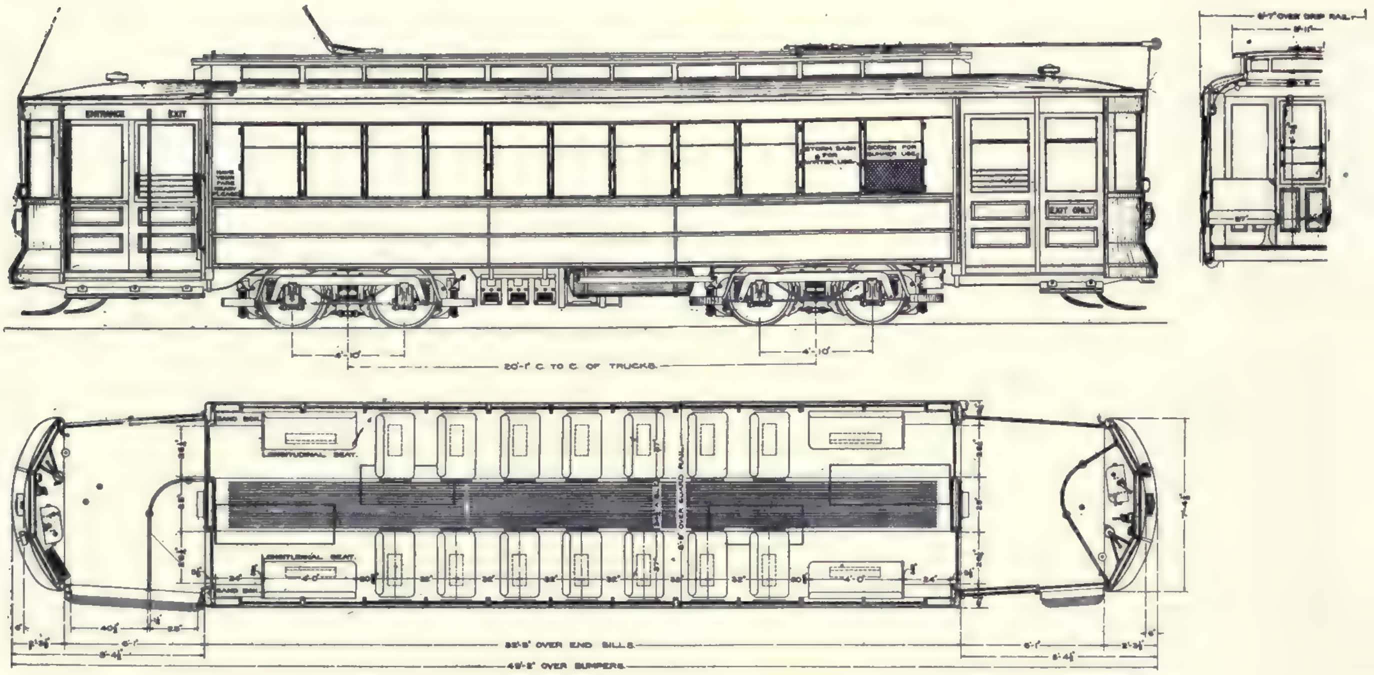

Fig. 1—General drawing of the first car design made by the Board of Supervising Engineers in 1908

THERE has been progressing in Chicago a continuous study of the elements of street car design since the 1907 franchises established the Board of Supervising Engineers, giving to that board complete charge of all work during the first three years constituting the rehabilitation period, and supervision of all work thereafter during the life of the grants. The ordinances named Bion J. Arnold as chairman of the board, and hence the work hereinafter related in connection with the progress of car design through the successive purchases since 1907 may be said to have been done under his general supervision. For the first three years, Mr. Arnold was also chief engineer of all new work. During this period 1,050 new cars were added to the system in three lots—600 composite cars in 1908, fifty all-steel cars in 1908-1909, 350 composite cars in 1909 and fifty composite cars in 1909-1910. This number was in excess of the franchise requirements, but was needed to care for the rapidly growing business of the companies.

Probably the most comprehensive idea of this car design work in Chicago can be gained from a study of the accompanying large table. Into this has been compacted what in effect reveals almost at a glance the complete story of the dimensioning and equipment of Chicago street cars, and the trend of development of each important detail. It covers the 2,445 cars added to the Chicago properties since and including 1907. By running down any of the columns the reader can quickly note what the trend has been as to the particular item. By such a study it will be noted, among other things, that the per seat weight of car body has been progressively decreased from 520 lb. to 219 lb., or per cubic foot of contents from 7.9 to 5.64 lb.; that the weight of the car completely equipped has shown the notable decrease per cubic foot of contents from 20.5 lb. to 11.7 lb.; that the weight of the trucks in per cent of total weight of cars has decreased from 35.5 to 19.6; that the weight of the motor equipment per horsepower has decreased from 60.5 lb. to 38.3 lb., etc. This brings out the fact that the general progress in car design is the result of the engineering and study put upon the subject by manufacturers and railway engineers alike, for both have contributed materially toward improving the efficiency and strength of the cars per unit weight.

The table discloses some interesting tendencies with respect to car body dimensioning. The car platform length, set at approximately 8 ft. with the first standardization of cars, thereafter was brought down to as short as 6 ft. 11 in., whereupon the trend was again back toward 8 ft. In fact, the newest cars of the two-man type now on order will have platforms 8 ft. 1 in. long. The value of the large platform in prepayment service has been thoroughly established. Since the adoption of the arch roof in 1912, the over-all heights of car bodies have been somewhat reduced. This has tended to lighten the weight, though ample headroom and volume of car body has not been sacrificed. Step heights have been gradually reduced as more compact motors have become available. The improvements in the weight per cubic foot of car body became effective when the change in car side construction was introduced in 1913-1914. At this time a straight steel girder side was adopted as standard construction and this avoided much duplicate weight in the car side as compared with the previous construction employing a girder inside of the car wall and a curved construction on the exposed side. The improvement in the relative weight of the truck in comparison with the total car weight is of course the result not only of the use of better materials and more careful designing, but also the advance in motor construction which made possible the use of wheels of smaller diameter. A further study of the tables will reveal many more interesting comparisons tending to show the trend of the art of car designing as it has been worked out in Chicago.

At the time of the passage of the 1907 ordinances the companies had available for operation 905 double-truck cars, most of which were of the best design then known to the art, as they had been but recently purchased in 1905 and 1906. The remaining cars were of such construction and dimensions that practically all of them could be, and later were, rebuilt to conform as far as possible to good practice in car design as then established.

In the fall of 1907, one of the companies added 300 double-truck cars to its equipment, with full approval of the board. These cars had been designed and provided for prior to the passage of the 1907 ordinances. As these 300 pay-as-you-enter cars were of the latest and best type then known to the art, resulting from a most extensive study of cars in all cities in the country, they were carefully studied by the board in connection with its design of the additional passenger cars required immediately under the new franchises. The platform layout of these 300 cars designed prior to the creation of the board and the generous dimensions of door openings, aisle widths and seat spacings, all planned to promote the comfort of passengers and their rapid and easy movement, are among the features. These cars were designed for double-end operation, which is the general standard in Chicago service.

IMPORTANT DETAILS OF 1908 CARS

As a result of observations made of the time of loading passengers on the 1907 cars, it was decided that the entrance passageway on the 600 board-designed cars bought in 1908 should be made about 40 in. instead of 34½ in., as it was believed that this would permit more rapid loading of passengers and would also increase the storage capacity of the platform, which was an important gain in a prepayment type of car. The details of this design are shown in Fig. 1.

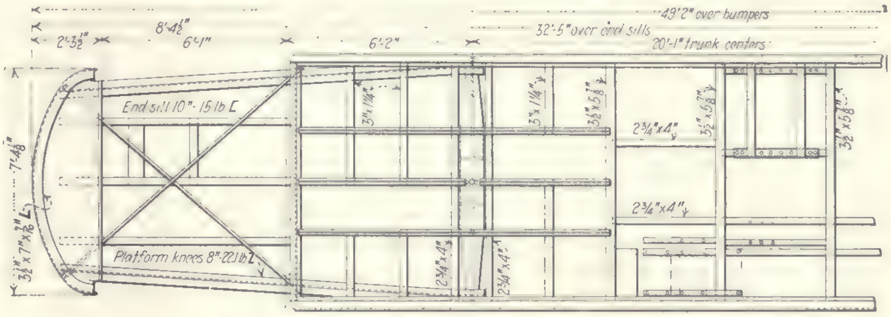

Fig. 2—Underframe construction on 1908 cars

Among other changes incorporated in the 1908 cars were the following: The cross-seats were spaced 32 in. centers instead of 33 in. This was done principally to increase the knee room between the longitudinal seats and the adjacent cross-seats. Cross-seat cushions were made 17 in. x 34 in. in order to provide a little more comfortable seat. This, together with the fact that the 1908 cars were made 8 ft. 7 in. wide over drip rails instead of 8 ft. 11 in. involved some sacrifice in the aisle width but still left it 24¾ in., sufficient to accommodate the movement of passengers and provide for standees. While the car width was reduced 3 in. the aisle width even with a longer seat cushion was reduced only 2 in. This result was made possible by the adoption of a car with raise sash instead of drop sash. It was realized that raise sash would not provide a semi-open car as is possible with the sash arrangement on the 1907 cars. Observations indicated, however, that this feature was frequently not taken advantage of so that a design would give the same practical results. The raise type of sash have other advantages, such as maximum width of aisle for a given over-all width, absence of pockets and comparative ease of operation, which caused this type of car to be selected. It may be noted that all cars since built are fitted with raise sash. Storm sash are fitted to these cars for winter service, as is also done with the 1907 cars. It has been observed that these storm sash make it possible to keep the cars at least 5 deg. warmer.

The sash frames throughout these cars were made of pressed steel treated to eliminate rust. Steel sash with narrow rails were used because it was felt the following advantages would be secured: Long life; no sticking in sash runs; increased light in the car and wider vision for passengers.

This type of sash was not successful from the standpoint of life in service, most of them lasting from twelve to fourteen years, but many considerably less. The other advantages were realized.

The floors in these cars were made of maple instead of hard pine so as to reduce the wear, especially between seats and around doorways. The maple floor has proved its merit in service and it has been standard construction since.

In designing the underframe to support a car body in which raise sash were used, it was not thought practical to utilize an overtruss because it would interfere with the placing of seats between the body side posts. This decision was also influenced by the fact that due to the great overhang of the platforms and their large carrying capacity, the stress in a truss bar of any practical section would be excessive. A plate girder design (Fig. 2) was therefore decided upon and in planning the section of this girder it was of course recognized that the most economical design would be one with the maximum possible depth. In a street railway car where wood superstructure is used, the maximum depth of girder is the distance from the bottom of the side sill to the bottom of the side window openings. In this case it was about 18 in. At the time of the design of these cars it was not thought practical to place the web of the girder so that it would form the outside wall of the car, because of direct exposure to mechanical injury and the desire to retain the concave-convex car side. The girder was therefore so placed that its web formed the inner wall of the car and the body side posts were placed outside. The body posts were covered with wooden sheathing and this sheathing protected with sheet-steel panels.

In determining the cross-section of the girder side sill a loading table was made up which showed the weight and location of all apparatus, fittings and equipment of the car and the weight and distribution of the passengers based on maximum loading. From these data and the dimensions of the car framework was calculated the bending moment at the critical section, viz.: the body bolster location, where, of course, the moment is maximum. The maximum bending moment in the platform knees was also obtained from these data. The section of the side sills of the underframe was built up to give the required section modulus which was based on a unit stress of approximately 12,000 lb. per square inch.

The platform knees are made of 8-in. Z bars of such weight and so reinforced with angles at the body end sill that they have a good margin of safety. After fourteen years service the side sills and platform knees of these cars are still in perfect alignment.

The end sills are made of 10-in. standard steel channels, and as the platform knees are of steel there is metal to metal bearing between these members. This construction was adopted to eliminate any possibility of looseness developing at the juncture of end sill and knee. The steel channel and sill is also lighter than the composite type. This was the first lot of cars in which the steel channel end sills was used and it was considered to possess such advantages as to make it standard construction on all cars since built. Experience has fully confirmed the wisdom of this choice.

The body bolsters were made in one piece of cast steel, and it is believed that this is one of the first instances in which this kind of bolster was used in street railway cars. Cast steel was chosen because it was believed weight could be saved and a stronger and more reliable construction secured. Experience has confirmed this belief, and as far as is known, out of several thousand in service, none have failed, although several have been badly bent in wrecks. In such cases they have been straightened and returned to use.

In the framing around trapdoor openings in the floor T-iron was used as in the 1907 cars. This construction has proved good in service and has been followed in all subsequent cars.

The platforms of these cars are of such length that diagonal bracing was considered necessary and it was provided with rods. This has proved effective in service. The underframe as a whole is very substantially constructed, although somewhat less in weight than that for the 1907 cars. Part of this reduction in

Data Covering Dimensioning, Construction, Equipment and Weights

Item Number	Number of Cars	Year Added to the Properties	General Type (All P. A. Y. E.) (All closed except 1907 group)	Seating Cap.-acity			Standing Room (Sq.Ft.)	Principal Dimensions of Car					Trucks		Air Brake Equipment		Motor Equipment	
				Body	Platform	Total		Length of Body	Length of Platform	Length of Overall	Width Overall	Height of Body-Bottom of Sill Over Roof.	Type	Wheel Base	Type	Size of Compressor, Cu.Ft.	Number of Motors	Type
1	300	1907	Dble truck, dble end, semi convert	40	.	40	166	32 ft.-5 in.	7 ft.-11 in.	48 ft.-3 in.	9 ft.-0 in.	8 ft.-11¼ in.	Brill 27-FE-1	4 ft.-6 in.	National A-4	16	4	G.E.-80 straight series
2	600	1908	Dble truck, dble end	40	..	40	165	32 ft.-5 in.	8 ft.-4½ in.	49 ft.-2 in.	8 ft.-9 in.	8 ft.-10⅝ in.	Pullman 150	4 ft.-10 in.	National A-4	16	4	GE-216-A interpole
3	50	1908-09	Dble truck, dble end, all st	40	..	40	162	32 ft.-5 in.	8 ft.-4½ in.	49 ft.-2 in.	8 ft.-9 in.	8 ft.-8½ in.	Pullman 150	4 ft.-10 in.	National A-4	16	4	G.E.-216-A-interpole
4	350	1909	Dble truck, dble end	40	.	40	143	31 ft.-6 in.	7 ft.-3 in.	46 ft.-0 in.	8 ft.-6 in.	9 ft.-0 1/16 in.	Pullman 150	4 ft.-10 in.	National A-4	16	4	West. 319-B interpole
5	50	1909-10	Dble truck, dble end	40	..	40	144	32 ft.-0 in.	7 ft.-0 in.	46 ft.-0 in.	8 ft.-6 in.	8 ft.-11⅝ in.	Brill 27-FE-2	4 ft.-6 in.	Allis-Chalmers AA-6	16	4	G.E.-80 straight series
6	215	1912	Dble truck, dble end	40	.	40	136	31 ft.-2 in.	6 ft.-5 in. 6 ft.-11 in.	44 ft.-0 in. 45 ft.-0 in.	8 ft.-6 in.	8 ft.-10¼ in.	Brill 27-GE-1	4 ft.-10 in.	National A-4	16	4	G.E.-226 interpole ventilated
7	125	1912	Dble truck, sgle end, near side	53		53	124	38 ft.-1 in.	7 ft.-7 in.	45 ft.-8 in.	8 ft.-6 in.	8 ft.-10 in.	Brill 39-E	4 ft.-10 in.	G. E. C.P.-27	16	2	West. 306 interpole
8	100	1913	Dble truck, dble end	50	5	55	121	32 ft.-8 in.	7 ft.-8 in.	48 ft.-0 in.	8 ft.-6 in.	8 ft.-11⅛ in.	Brill 39-E	4 ft.-10 in.	G. E. C.P.-27	16	2	G.E.-242 interpole ventilated field control
9	200	1913-14	Dble truck, dble end	48	5	53	127	32 ft.-5 in.	8 ft.-0 in.	48 ft.-5 in.	8 ft.-6 in.	8 ft.-7⅞ in.	Brill 39-E.	4 ft.-10 in.	National A-6	16	2	West.-534 interpole ventilated field control
10	228	1914-15	Dble truck, dble end	50	5	55	127	32 ft.-8 in.	7 ft.-8 in.	48 ft.-0 in.	8 ft.-6 in.	8 ft.-8¾ in.	Brill 39-E.	4 ft.-10 in.	G. E. C.P.-27	16	2	G.E.-242 interpole ventilated field control
11	1	1921	Sgle truck, dble end, 1-man safety (Ry. design)	36	..	36	72	....	....	29 ft.-4½ in.	8 ft.-0 in.	8 ft.-5 1/16 in.	Brill 79-E	8 ft.-0 in.	C.E. C.P.-25	10	2	G.E.-264 interpole ventilated
12	10	1920	Sgle truck, dble end, 1-man safety ("standard")	32	.	32	60	....	....	28 ft.-0½ in.	7 ft.-8 in.	7 ft.-5 11/16 in.	Brill 79-E	8 ft.-0 in.	G.E. C.P.-25	10	2	G.E.-264 interpole ventilated
13	1	1921	Dble truck, dble end, 1-man safety	36	10	46	95	23 ft.-8 in.	6 ft.-9 in.	37 ft.-2 in.	8 ft.-6 in.	8 ft.-8¼ in.	Brill 77-E-1	4 ft.-10 in.	Westinghouse Bungalow	16	4	West.-508 interpole ventilated
14	101	1921	Dble truck, dble end, trler	60	2	62	117	....	....	47 ft.-6 in.	8 ft.-6 in.	8 ft.-8¼ in.	Brill 67-F	4 ft.-4 in.	....	....	..	Trailers
15	45	1922	Dble truck, dble end, 1-man safety	40	10	50	101	26 ft.-1½ in.	6 ft.-9 in.	39 ft.-7½ in.	8 ft.-6 in.	8 ft.-8¼ in.	Brill 39-E	4 ft.-10 in.	G.E. C.P.-27	16	2	G.E.-275 interpole ventilated
16	69	1922	Dble truck, dble end, 2-man	44	6	50	146	32 ft.-9 in.	8 ft.-1 in.	48 ft.-11 in.	8 ft.-6 in.	8 ft.-8¼ in.	Brill 51-E-2	4 ft.-10 in.	G.E. C.P.-127	20	4	G.E.-275 interpole ventilated*
	2,445																	

* Capable of handling trailers in all-day service. † Weight of truck without motor in per cent of maximum center plate load. *e* Estimated. *a* Approximate. *x* At 600 volts.

weight is due to the fact that this car is 3 in. less in width, though better design was also a factor.

ALL STEEL CARS PURCHASED IN 1908-1909

The chief engineer of the work under the 1907 ordinances felt that in view of the possibilities of all steel cars it would be wise to secure some experience with such equipment. Under his direction, plans and specifications were prepared for the construction of fifty such cars, listed in the table as the 1908-1909 group. It was expected that the following advantages would be realized with these steel cars: Long life, fireproof, and low maintenance cost. The general dimensions of these cars and the arrangement of seats and platforms is the same as for the 1908 cars just discussed.

It was the intention to eliminate wood from their construction as far as practical and the only items in which this material is used are:

Steps: The step boards or treads were made of wood principally because of ease of repair.

Floor mat strips: These were made of hard maple to provide an anti-slip surface and a readily renewable construction.

Body and platform doors: Doors were made of wood to save weight and cost.

Trolley boards: These were made of wood in order to provide a proper insulation for the trolley bases.

In other places where wood is customarily used, steel was substituted.

The framing is characterized by the use of thin pressed sections throughout, with the exception of a few connections where steel castings are used. In the underframe, the platform knees, end sills, bolsters and crossings are all pressed members. The sections of these members except the end sills are varied in depth which results in light-weight construction. The side member is of the girder type with $\frac{3}{32}$-in. web plate extending from bottom sill to the window arm rest and reinforced at this point with a flat bar. This was the first lot of cars in which this type of frame was used. The girder is so placed that the web forms the inside wall of the car, the steel posts being riveted to the outside of the web. On the outside faces of the posts is riveted the outside steel panels, which are so placed with guard rail between top and bottom panels as to give the appearance of a concave-convex side car. This construction was possible because of the use of steel side posts which permitted a thin side wall. It was necessary however, to decrease the aisle width ¾ in.

These steel cars weigh about 500 lb. less than the 1908 composite type cars, both being built to substantially the same dimensions. They have been quite satisfactory in service, but experience has shown that the composition cement floor is not practical. It wears rapidly, is very heavy, and makes an uncomfortable floor to stand on in wet or cold weather. These floors have been replaced with wooden ones. The thin interlocking steel floor base has also proved impractical in that it rapidly rusts out, especially at points where wheel wash is thrown against it. This is also true of all thin sections of the underframe which are exposed to such action.

The expectation that it would be comparatively easy to replace bent or damaged sections has not been altogether realized, owing in many instances to the method of fastening these parts to the framing. The steel sections such as vestibule posts and body corner posts are of such shape that they are very resistant to mechanical injury and therefore they

of Chicago Street Cars Showing Trend of Development

Motor Equipment					Heaters		Lights (All 25-watt Mazdas)								Underframe					Height of Car Steps (In.)			Weight of Car Completely Equipped Less Passenger Load (Lb.)					Weight of Bare Car Body (lb.) (approximate)						
Weight (lb.)																																		
Motor Less Gearing	Per Lb. at 500 V.	Total rating motors Per car at 500 V.	H.P. per ton of Light Car	Controllers	No. Platform	No. Body	Watts per car at 550 V.	In Signs	On Platforms	Headlights	In Body	Total	Roof Construction	Side Construction	Type	Bolsters	Dia. Wheels (In.)	Height at floor (In.)	Ramp on car floor (In.)	Rail to Step	Step to Platform	Platform to Car Floor	Total Car	Per Seat	Per Foot Length	Per Sq.Ft. of Floor Area	Per Cu.Ft. of Contents	Total Body	Per Seat	Per Ft. of Length	Per Sq.Ft. of Floor Area	Per Cu.Ft. of Contents	Trucks,† Weight Factor, Per Cent	Item Number
2,420	60.5	160	5.92	K-28	2	20	12,584	2	2	2	21	27	Monitor Deck	Curved, Concave-Convex	[1] Over truss semi-steel	Steel built up bolted	34	40⅞	none	17	13	10	54,040	1,351	1,120	161	20.5	20,800	520	431	62	7.90	35.5	**1**
2,430	60.8	160	6.04	K-35	2	20	12,584	2	2	2	21	27			[2] Plate girder semi-steel	Cast Steel	34	40	none	17	13	10	53,060	1,325	1,078	155	20.9	20,000	500	407	58	7.90	32.3	**2**
2,430	60.8	160	6.09	K-35	2	20	12,584	2	2	2	21	27			[3] Plate girder all steel	Pressed Steel	34	40	none	17	13	10	52,500	1,313	1,068	150	20.8	19,550	488	397	56	7.78	32.5	**3**
2,587	64.6	160	6.34	K-35	2	20	12,584	2	2	2	21	27			[2] Over truss all steel	Cast Steel	34	40	none	15	14	11	50,500	1,263	1,098	160	21.9	17,530	438	381	55	7.62	33.6	**4**
2,420	60.5	160	6.03	K-28	2	20	12,584	2	2	2	21	27			[2] Over truss all steel	Cast Steel	34	41½	none	16½	14	11	53,040	1,326	1,152	171	23.2	19,000	475	413	61	8.32	35.0	**5**
2,037	58.3	140	6.11	K-35	2	20	12,584	2	2	2	16	21	..		[2] Plate girder	Built up riveted	34	40⅜	none	16⅛	13⅝	11	45,500	1,138	1,011	148	20.4	15,600	390	347	51	7.00	33.8	**6**
2,553	51.1	100	5.46	K-36	2	20	12,584	2	2	1	20	25	..		[2] Over truss all steel	Cast Steel	34	39	1½	14	13	10½	36,600	691	802	118	15.1	15,000	283	329	48	6.25	28.0	**7**
2,982	54.2	110	5.10	K-51	2	22	12,584	5	4	2	18	29	..		[2] Over truss all steel	Cast Steel	34	38½	3	13½	12	10	43,120	785	898	131	17.8	19,150	348	334	58	7.85	25.0	**8**
2,533	50.6	100	5.50	K-51	2	22	11,800	2	2	2	16	22	Arch Roof	Straight Steel Sides	[2] Deep Plate Girder	Cast Steel	32	37	2½	13	11½	10	35,800	676	739	104	13.8	13,720	259	283	40	5.30	26.3	**9**
2,982	54.2	110	5.47	K-51	2	22	12,584	5	4	2	18	29			[2]	Cast Steel	34	39	3	13½	12¼	10¼	40,180	730	838	118	16.1	17,000	309	354	50	6.80	25.0	**10**
900	45.0	50x	....	K-63	..	12	7,200	4	4	2	8	18			[2]	....	26	27 3/16	.....	14	13 3/16	....	16,375	457	560	84	11.7	7,900	219	269	41	5.64	19.6	**11**
900	45.0	50x	...	K-63	.	12	7,200	4	4	2	8	18			[2]	.....	26	28 15/16	none	16⅞	12 1/16	....	16,460	514	588	87	12.9	8,100	253	289	43	6.37	20.6	**12**
900x	45.0	100x	5.7x	K-35	4	18	10,648	3	4	2	14	23			[2]	Cast Steel	26	31	none	13	12	6	28,050	623	755	107	14.1	10,900	238	288	41	5.40	31.5	**13**
......	.....	......	......	......	2	22	11,616	..	.	..	20	20	..		[2]	Cast Steel	22	31¼	5⅜	15¾	...	10¾	26,000	419	549	78	10.4	14,080	227	297	42	5.64	22.4	**14**
2,300x	38.3	120	6.6	K-68	2	20	10,648	3	4	2	14	23	..		[2]	Cast Steel	28	33	none	4¼	12¾	6	30,300	606	765	113	15.2	11,100	222	281	42	5.56	30.0	**15**
2,300x	38.3	240	8.7x	K-35 HH	2	22	12,584	5	4	2	18	29	..		[2]	Cast Steel	28	37½	none	15⅛	13 1/16	9 5/16	46,000e	920	941	135	17.6	15,500	310	327	46	5.90	30.7	**16**

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[1] Bottom sash drop into pockets; top sash raise into roof. [2] Bottom sash raise. [3] Bottom sash drop into pockets.

suffer little from those blows which would do considerable damage to wooden posts. The same is more or less true of the body side panels. As far as these items are concerned the upkeep cost has been reasonable. A considerable stock of spare pressed sections were purchased with the cars and replacements have thus been available.

No additional all-steel cars have been purchased by the Chicago companies, chiefly because of the high first cost of such cars, which in this instance amounted to about 20 per cent more than the 1908 composite cars. Shop equipment is also laid out on a basis of repair for composite cars. The tendency, however, in car design is toward a greater use of steel as will be noted from the discussion on the later lots of equipment added to the Chicago properties.

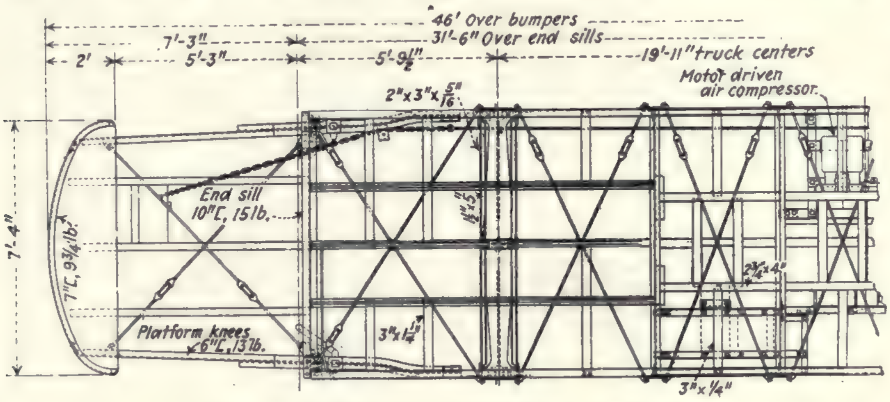

Fig. 3—Underframe construction on 1909 cars

350 SMALLER CARS PURCHASED IN 1909

The companies with the addition of the 950 large double-truck PAYE cars just described, and the remodeling of 100 such cars acquired just prior to Feb. 1, 1907, now owned 1,050 large cars capable of satisfactorily handling the heaviest service.

It was therefore felt that sufficient equipment of this class was available for some time to come and that the immediate requirements could be met with cars of somewhat smaller capacity. The next lot of equipment, 350 cars, added in 1909, were therefore built somewhat smaller.

The concave-convex car sides with top and bottom panels divided by a guard rail was followed again in these cars as in former designs because of the belief that the appearance of such design is superior to any other. The wooden panels in this case were, however, not covered with steel plates as formerly. These plates were omitted to save weight, it being estimated that this omission would result in a saving of approximately 450 lb. per car. It was recognized that there would probably be more smashed side panels than if the steel cover plates were used, but on the other hand, the steel plates gave considerable trouble due to rusting out. These steel panel plates were later removed from the 1908 cars for the reasons just stated.

SLIDING TYPE OF BULKHEAD DOORS ADOPTED

The body bulkhead doors were all made of the sliding type, instead of one sliding and one swinging door as in the 1908 cars. This change was made because of the inconvenience of the swing door, and the space taken by it in swinging into the car body. The swing door is not easy to keep in adjustment to prevent it blowing or standing open and its cost of upkeep is greater than the sliding door. A 10-in. saving in car body length was possible through this change.

By spacing the cross-seats somewhat closer, an additional saving in car body length was secured, so that in these cars, this dimension is 31 ft. 6 in. as compared to 32 ft. 5 in. in the cars preceding this equipment. The over-all width of the car is 8 ft. 6 in. instead of 8 ft. 9 in. and 8 ft. 11 in. in the earlier models. This change in over-all car width was made to provide somewhat more space between passing cars and to reduce car dimensions and therefore weights to the lowest practicable figures consistent with good design and the requirements of the service.

The monitor type of roof was used on this as on all previous cars, principally because it was then thought that sufficient ventilation was difficult to obtain in any other type of roof construction. By virtue of the thin car side walls made possible with a raise sash design, cross-seats with 17-in. x 34-in. cushions and an aisle of 24-in. width between seat end plates were secured with an overall width of 8 ft. 6 in. The underframe for these cars was designed with a view of obtaining the lightest structure possible consistent with the loads to be carried and is shown in Fig. 3. Experience with former cars having shown the desirability of lateral stiffness in the car underframe, this design was liberally provided with diagonal rod bracing which is effective and light in weight.

It was also decided to use a special type of steel body post with corrugated sides which had been successfully used in other classes of cars. The corrugated sides of this post form the sash and curtain runways. These steel posts also make possible a thin side wall because their depth can be made less for the same strength than wooden posts. These steel posts were specially treated to minimize rusting.

While these posts have given satisfactory service they have not been used in succeeding lots of equipment chiefly because of their special design, which means added cost and requires special sash fittings. The anti-rust treatment has not been altogether successful.

Steel sash were used in these as in the 650 cars immediately preceding. As in the earlier cars, these sash have suffered from corrosion due to rust and have been largely replaced with brass sash, and more recently, because of excessive cost of metals, replaced with wood sash.

TREND TOWARD REDUCED DIMENSIONS CONTINUES

The last lot of cars, fifty in number, added by one of the companies in the three-year period of immediate rehabilitation and listed in the table as the 1909-1910 group, were also of somewhat less dimensions than the first 950 large cars. These are very similar in general dimensions and equipment to the lot of 350 cars just described and listed as the 1909 group. They have proved very satisfactory in service.

This brings the discussion of Chicago's car design experience and development down through the cars purchased during the three-year rehabilitation period. The development since that time, carried up through the 1922 additions to rolling stock, will be published in next week's issue of the *Electric Railway Journal.*

Experience with Chicago Track

By CHARLES S. HOLCOMB
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The Types of Construction Used Since 1907 Have Given Very Good Results—The Few Changes in Details Found Desirable to Meet Heavy Duty Are Related—Weighted Life of Track and Special Work and Relation Between Traffic and Rail Wear Given

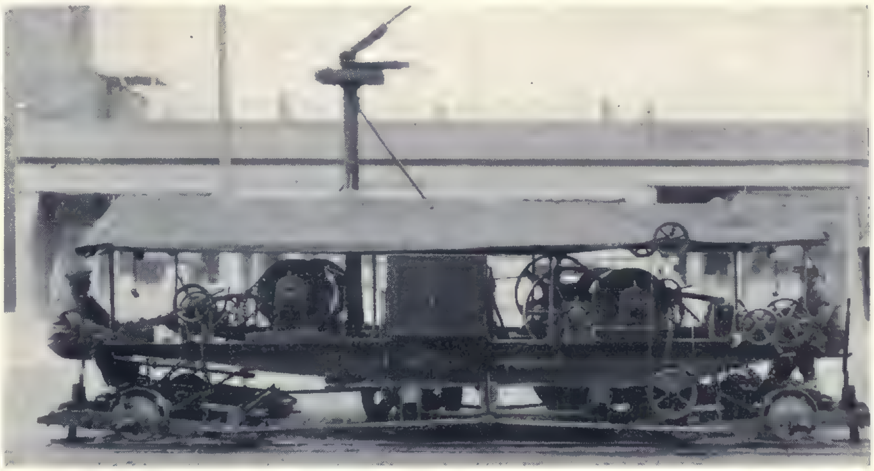
THE greater part of the street railway traffic in Chicago has been carried on four types of track used in rehabilitating the surface lines since 1907. For convenience these types will be briefly described in the following order: Type 2-A, Type 2, Type 1 and Type 3.

Type 2-A track was constructed with 9-in. 129-lb. grooved girder rail laid on 6-in. x 8-in. x 7-ft. wood ties surfaced four sides. These ties were imbedded in concrete which extended from 6 in. below to about 3 in. above the tie. The tie spacing was 3 ft. on centers and the fastenings consisted of four screw spikes per tie used in connection with 7½-in. x 9½-in. shoulder tie plates.

Type 2 track was of the same general design as type 2-A, the variations from type 2-A being due to the fact that type 2 was built almost entirely on streets where the original track had been built for cable car operation and in consequence the new track had to meet certain special conditions. This old cable track had a continuous concrete slot down the center of each track and the rails were supported on heavy iron yokes, well imbedded in concrete and spaced about 4 ft. on centers.

In most cases this old concrete was in excellent condition and could have been entirely removed only at great expense. This expense would not have been justified as the old concrete made an unusually solid sub-foundation for the new track. As a consequence where new track was laid above cable track only such portions of the old cable concrete were cut away as was necessary in order to have not less than 6 in. of new concrete below the ties and not less than 12 in. under the rails.

It was the general practice on this type of track to place the ties for the new track between the cable yokes of the old track. Type 2 track might therefore be described as type 2-A track with the tie spacing about 4 ft. instead of 3 ft. and with pyramids of material from the old track projecting up between the ties. Nearly all of the type 2 track built was built during the years 1907 and 1908.



Double-end grinding machine has greatly facilitated removal of corrugations and lowered the cost

Type 1 track was of the same general design as type 2 except that steel ties, attached to the rail by clips and wedges, were used instead of wood ties. Nearly all of the type 1 track was built during the year 1907.

Type 3 track was constructed with 9-in. 129-lb. grooved girder rail laid on 6-in. x 8-in. x 7-ft. wood ties surfaced four sides. These ties rested on 8 in. of crushed stone or crushed slag ballast and were covered with concrete from the bottom of the tie to about 3 in. above the tie. The tie spacing was at 2-ft. centers and the fastenings consisted of four screw spikes per tie used in connection with 7½-in. x 9½-in. shoulder tie plates.

TABLE I—MILEAGE OF TRACK BUILT IN CHICAGO BY TYPES UP TO JAN. 31, 1922

Year	Type 1	Type 2	Type 2-A	Type 3
1907..........	6.884	11.352	3.484	24.723
1908..........	.....	57.058	10.509	28.955
1909..........	.....	......	86.849	31.887
1910..........	.....	......	37.952	21.490
1911..........	.....	......	64.116	38.997
1912..........	.....	......	30.610	8.494
1913..........	.....	......	42.356	19.933
1914..........	.....	......	31.226	20.136
1915..........	.....	......	37.691	3.208
1916..........	.....	......	34.303	2.903
1917..........	.....	......	17.256	1.563
1918..........	.....	......	3.650	3.549
1919..........	.....	......	1.491	0.854
1920..........	.....	......	0.294	0.234
1921..........	.....	......	....	0.341
Totals......	6.884	68.410	402.547	207.266

As stated before, types 1 and 2 were used almost exclusively where new tracks were laid over old cable track construction. Both types 2-A and 3 have been laid on almost every variety of subsoil in the city and under all kinds of traffic density. In a general way, however, type 2-A track has been used where the subsoil conditions were poor and where traffic conditions were such that the track concrete could be allowed fourteen days to set before the track was opened to service, while type 3 track has been used where the subsoil conditions were good and traffic conditions were such that the track concrete could not be allowed fourteen days to set. An accompanying table shows the amount of each class of track built up to Jan. 31, 1922.

Type 1 track was discontinued after 1907 and type 2 after 1908, but this was due largely to the fact that the greater part of the old cable track had been reconstructed by the end of 1908 and that type 2-A was better suited to other conditions where a solid concrete foundation was desired. Types 1 and 2 were built chiefly on streets that contained old cable track and as these were the main lines of travel to and from the business district these two types have been under very heavy traffic ever since they were laid without giving any special trouble attributable to the type of construction. As stated before, the tie spacing on this track was governed largely by the spacing of the old cable yokes, which was about 4 ft. on centers. While no special trouble has resulted from this wide tie spacing it throws a considerable strain on the rail fastenings and ties, especially under the heavy and continuous traffic that these types have carried, and this is another reason for the change to type 2-A track where the tie spacing is at 3 ft. centers.

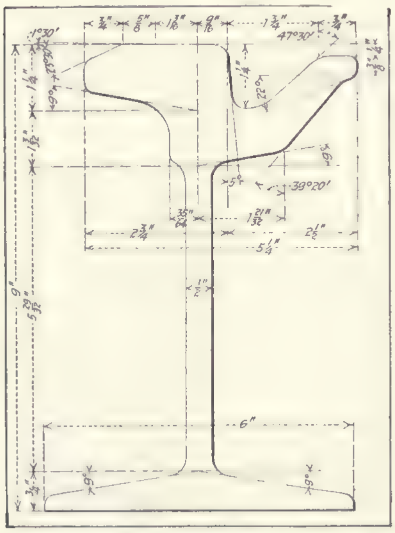


Fig. 1—Rail section used as standard in Chicago

Types 2-A and 3 have been used with equal success in most places, the type of track being governed largely by whether or not it was possible to hold traffic off the track for the two weeks required for type 2-A. In the downtown business or Loop district, where most of the streets could not be closed for two weeks, the tracks are very largely of type 3 construction, which has been satisfactory under these trying conditions.

TABLE II—AVERAGE WEIGHTED LIFE OF TYPES 1, 2, 2-A AND 3 TRACK

Type of Track	*Average Weighted Life Years	Remarks
1	14.5	
2	13.7	
2-A	9.5	
2 and 2-A	10.0	All solid concrete track having wood ties.
1, 2, and 2-A	10 1	All solid concrete track.
3	10.9	All ballasted track.
1, 2, 2-A and 3	10.4	All heavy construction track.

* The average weighted life was obtained by multiplying the number of feet of track of each kind built in each year by its age as of Jan. 31, 1922, and dividing this total by the amount of track of each type as of Jan. 31, 1922.

Considering the whole track structure as a unit, none of the four types of track under consideration can be said to have worn out or be likely to wear out for some time to come. Certain portions of the track structure have had to be replaced, but these replacements have in most cases, been due, not to the type of track but to the failure of the parts themselves. These items will be considered in detail later. The life of Chicago track on a weighted basis is given in Table II.

The variation in car traffic over the standard types of track is very great, running from a maximum of eighty-two cars per hour for a twenty-hour day down to about eight cars per hour. The vehicular traffic also varies as greatly, being all the way from practically nothing to an almost continuous line of heavily-laden trucks and wagons. This variation in traffic conditions will be taken up again in connection with a discussion of rail wear.

SUBSOIL CONDITIONS IN CHICAGO

Three general types of subsoil are encountered in Chicago—sand, clay and filled land. Along the entire lake front and for some distance back into the city the soil is almost entirely lake sand. When properly confined this gives a firm foundation and excellent drainage. In the more westerly sections back from the lake shore the soil is almost entirely clay. This clay is thoroughly rolled before placing the track and has given good satisfaction as a foundation although it has been necessary to install drain tile at some locations. Both solid concrete and ballasted types of foundation have been used with success on this subgrade, but the solid concrete type has been used to the greater extent. In the southeast portion of the city, known as South Chicago, the streets are above the level of the natural ground in many places and tracks laid on these streets have a subgrade composed of the miscellaneous material used in filling. However, the traffic in this section of the city is comparatively light, hence almost no track of the heavier type of construction has been laid on such subgrade. There are a few locations where tracks cross ridges of limestone rock but the amount of such track is so small that no change in the type of construction has been made on account of such subgrade.

As noted before, the types of foundation used are two in number, solid concrete and crushed stone, or crushed slag ballast. Both of these types of foundation have given excellent results except in a few cases. In almost all of these cases the foundation failures were due to conditions over which the street railway companies had no control. In some cases the new tracks were built over sewer ditches which had been filled for some time and were supposed to have thoroughly settled but which later settled still further, causing a settlement in the track. In other cases, especially in the Loop district, deep building foundations excavated to the curb line caused the entire street to settle, including the railway tracks. In only one instance has it been necessary to change the type of foundation on any considerable length of track because of foundation failure. This was on 1½ miles of track laid as type 3 in 1907, which settled so badly, due to poor subgrade, that it was necessary to place a 2-A foundation under it in 1914.

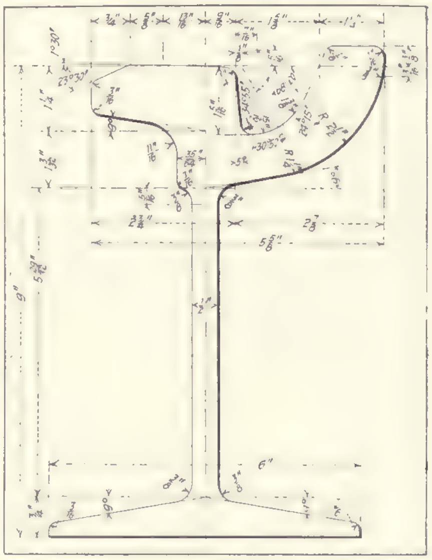


Fig. 2—Guard rail used in Chicago which fishes with standard section

Several kinds of ties have been used at various times, but by far the greater number are 90 per cent heart untreated, long leaf yellow pine, 6 in. x 8 in. x 7 ft., dressed on four sides. In the earlier years a small per cent of treated ties were used, the greater number being treated with creosote and zinc chloride. No special difficulty has been encountered with any of these ties except those treated with zinc creosote. Where such ties were laid, the rail soon showed signs of loose fastenings and upon investigation it was found that the screw spikes used were so badly eaten away that they had lost practically all of their holding power. The use of zinc chloride treated ties was therefore discontinued.

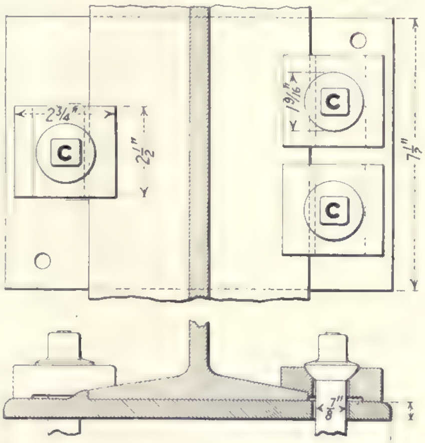
The long leaf yellow pine ties, when incased or partially incased in concrete as in the types under consideration, give a very satisfactory life. In fact, there is hardly any track of these types where there has been any appreciable tie renewal.

A large number of ties have been uncovered at the end in connection with the renewal of rail fastenings, and almost without exception they have been in such condition that new fastenings could be placed on the old ties. Most of these ties have had ten or more years in the track and in many cases appear to be in much the same condition as when placed. In most cases where holes are bored for new screw spikes in these old ties, the borings brought up are of a gray color for the first half inch or so, but for the remainder of the depth are of the same bright yellow color as those coming from a new tie. It is interesting to note that in a large number of cases these borings were damp, showing that the ends of the ties at least have absorbed some water even though completely incased in concrete. In practically no case has the tie appeared to have become loosened from the surrounding concrete.

Oak ties, both with and without tie plates, were used in some of the earlier track. These ties have proved satisfactory but appear to have given no better results than the standard yellow pine tie.

Steel ties have likewise proved to be satisfactory, but their use has been confined largely to type 1 track and to locations where the shallower tie was needed to get adequate headroom. Several stretches of track have been laid under normal conditions with steel ties, but to date this track does not seem to have given any better results than similar track laid with wood ties.

Tie plates have been used on nearly all ties laid in types 1, 2, 2-A and 3, except for a few miles of track laid on oak ties in the earlier years of rehabilitation. The tie plates used until about 1913 were shoulder tie plates 7½ in. x 9½ in. x ½ in., but after that date a new shoulder tie plate 7½ in. x 10½ in. x ½ in. was introduced in connection with a new clip fastening. The latter is now the standard plate. It is described more fully in the next paragraph. Tie plates uncovered in connection with the renewal of rail fastenings generally show wear on the upper face of the tie plate, but as a general thing the plate has not cut down into the tie. The use of tie plates on heavy traffic streets is considered necessary in Chicago and no important track is now laid without them.



Present standard Chicago
rail fastening

The rail fastenings used in Chicago tracks are the only part of the track structure as originally designed in which any material change has been made or which has failed to date to have a life equal to that of the other portions of the track. The original rail fastenings consisted of the 9½-in. shoulder tie plate fastened to the tie with two lag screws, the outside of the rail base resting against the shoulder. The rail was held down by means of two screw spikes 6⅛ in. long with diameter varying from ¾ in. to ½ in. and having a head about $2\frac{1}{16}$ in. in diameter which had a direct bearing on the rail base.

Careful tests of the holding power of these spikes were made and from all indications the fastening was of sufficient strength properly to perform its function. However, after a number of years of service in track carrying heavy cars at frequent intervals, they began to show signs of failure and a heavier fastening, shown in an accompanying drawing, was adopted in their stead. The failure of the old type fastenings to come up to expectations was not due to lack of holding power so much as to the fact that the head became bent backward, thus allowing the base of the rail a considerable amount of play, which in the course of time wore away both the screw spike and the plate.

In the case of old-style screw spikes which have been in the track for a number of years, a noticeable amount of corrosion has taken place. In some cases this has gone so far that the spike is very materially reduced in diameter and shortened in length, so that the holding power of the spike is reduced to practically nothing. It is interesting to note that the corrosion of a screw spike in an untreated tie after about ten years' service resembles very closely the corrosion that took place in two and one-half years in a similar screw spike used in a tie treated with zinc chloride.

The new fastening that has been adopted has so far overcome the defects of the old one and up to the present time has developed no failings of its own. This fastening consists of a 7½-in. x 10½-in. x ½-in. shoulder tie plate fastened to the tie with two lag screws, the outside of the rail base resting against the shoulder with the rail held down by three sets of clips and screw spikes. The screw spikes used are 7¼ in. long and vary in diameter from ⅞ in. to ⅝ in. The head of the spike is $1\frac{9}{16}$ in. in diameter, with a spherical surface on the underside that fits into a cup in the top of the rail clip, thus forming a ball and socket connection with the clip, and insuring a firm bearing between the spike and the clip even if the spike is not driven exactly on the perpendicular. The clip is 2½ in. x 2¾ in. and varies somewhat in thickness, the thicker or outer end resting on the plate and the other end on the base of the rail. One of these clips is placed on the outside of the plate and the other two on the inside to help counteract the tendency of the 9-in. rail to tip outward under heavy traffic. This fastening is shown herewith and is proving very satisfactory, some of them having been in place for about nine years without showing indications of weakening.

Due to the weakness that developed

with the old fastenings it has been necessary within the last two or three years to renew the fastenings on the older and heavier traffic streets. This is done by removing the paving, chipping out the concrete along the rail, removing the old fastenings and placing the new ones on the old ties, reconcreting and replacing the paving.

It has been the practice on all of the heavier types of track to weld the rail soon after it is laid, preferably before traffic is allowed on the track. When the rails were first laid they were fastened together by a pair of short two-bolt joint plates to hold them in place during construction. As soon as the concrete had properly set (seven days for all solid concrete types) the joints were electrically welded.

The welded joint used up to and including 1920 was that known as the Lorain weld which was placed with the apparatus furnished by the Lorain Steel Company. About 125,000 original joints were applied to the types under consideration up to and including the year 1920. The use of the Lorain weld was discontinued after 1920 due to the fact that practically no extensions were being built and hence the amount of work in prospect was so small that the rental of the large amount of apparatus necessary to install the Lorain joint made its continued use uneconomical. Since 1920, seam welded joints have been installed by the companies' own men with the arc welding machine supplied by the Rail Welding & Bonding Company. These joints have been installed too short a time to tell how they will work out, but so far they seem to be giving satisfactory service.

The tie rods used on all types of track are 2 in. x 5/16 in. x 5 ft. 1/8 in. They are forged or rolled from a single piece of steel or iron and have 1-in. round threaded terminals with two nuts on each end. Tie rod holes are punched at intervals of 6 ft. along the rail, except that a tie rod hole is always punched 2 ft. from the ends of each rail. The tie rods in use at the present time are practically identical with those originally used, the service rendered by these having been so satisfactory that no change has been found necessary or desirable.

The rail section used on the street railways of Chicago is a special 9-in. section known as the Chicago section. It is shown on page 446. This section is specified in the ordinance as the section of rail that the companies must use on all heavy traffic streets. It has proved to be very satisfactory and the great majority of the rail originally laid is still in place. It has only been necessary to make a complete rail renewal on one continuous stretch of double track about ½ mile long on Wabash Avenue, one of the heaviest traffic streets leading out of the downtown district. This rail had given about fourteen years of service when removed. In addition to this rail renewal, a number of stretches of track at heavy stopping points have been rerailed, and a considerable amount of the old rail has been cut out in short pieces in connection with the rewelding of badly broken joints.

VEHICULAR TRAFFIC IMPORTANT IN RAIL WEAR

Such investigations as have been made in Chicago on the relation of wheel passes and tonnage to rail wear seem to indicate that there is no fixed relation existing under Chicago conditions. After the new types of track had been in service for about five years an extended survey of rail wear conditions was made, and the data compiled in connection with the number of cars that had passed over the rail, the comparisons being made on the basis of the number of car passes for 1/64 in. of rail wear.

The result of this investigation showed such a wide variation in the rail wear on the streets considered that a further study was made of the local conditions, with results that seemed to show conclusively that vehicular traffic was a very important factor in rail wear. This vehicular traffic varies so greatly with the seasons, building conditions, etc., that it is very difficult to get accurate data on its kind and amount except by detailed observations over a long period of time. Owing to this difficulty the study was not carried far enough to make possible an estimate of the amount of rail wear due to each kind of traffic.

The great variation in car passages per 1/64 in. of rail wear may be seen by comparing the results found on streets "A" and "B." The track on both of these streets was of the solid concrete type laid in the same year and examined after about five years of wear. On street A the average number of car passes per hour for a twenty-hour day was eighty-two, or considerably more than one per minute during the hours of operation, while on street B the corresponding figure was ten car passes per hour or a car about every six minutes. An examination of the rail wear on these two streets showed that on street A (heavy traffic) it required 286,800 car passes to wear the rail 1/64 in., while on street B (light traffic) the corresponding figure was only 66,400 car passes per 1/64 in. of the rail wear. In this connection it should be noted that while the empty cars on the two streets did not differ greatly in weight, the average load carried on street A was undoubtedly much greater than that carried on street B.

Further examination of these streets, however, revealed the fact that on street A the headway between cars was so short that heavy vehicular traffic practically never pulled on or off the tracks, while on street B the vehicular traffic on the tracks was very heavy, due to the presence of several large freight yards in the vicinity and to the fact that the section was building up very rapidly and the paving in the tracks presented the best hauling surface of any street in the neighborhood. Almost all of this traffic was carried on steel-tired wheels and the result was that the rails were strewn with sand and stone from the material wagons, which was ground up by the following car and vehicular traffic.

These streets are extreme cases, but they bring out most forcibly the fact that car traffic and loading are by no means the only important factors in wear of rail laid in paved city streets. An examination of Fig. 3 offers further proof of the important rôle that vehicular traffic plays in street railway rail wear. The wear shown on this section is entirely due to vehicular traffic, as the rail in question was laid in a paved street as an emergency track and was used only at very infrequent intervals by an occasional car. On the other hand it did carry a large amount of heavy freight traffic moved on steel-tired wheels.

While the foregoing data are of value as giving the experience of Chicago with its track, they give little of value for figuring future rail wear because of the fact that much of the hauling over these tracks was done with steel-tired wheels, while in the future much of it will be done on rubber tires which should have a decided tendency to increase the life of rail in paved city streets.

The large number of car passes

required to produce $\frac{1}{64}$ in. of wear on street A brings up one factor that was not considered in connection with the above studies, and that is the effect that the constant cold rolling to which the head of the rail is subjected has upon the structure of the steel itself. The data from streets A and B would tend to confirm the contention that the steel in the head of a rail subjected to traffic such as that on street A becomes much harder and more durable than the steel in the head of a rail subjected to traffic like that on street B.

The way in which the greater portion of the rail in Chicago has worn is shown in Figs. 4 to 8. Fig. 4 shows what is perhaps as typical a section as any of the general conditions of Chicago rail. Examined in the street this rail appears much as when laid except that the length of the bevel at the back of the head is not quite as great. The illustration shows, however, that the gage line has been worn back to some extent, that there is a slight wear on the lip of the rail opposite the gage line due to the bearing of wheel flanges, and that the top of the lip is worn down. This latter wear is due to vehicular traffic and not to wear from cars, and is evident to some extent on almost all Chicago rail.

Fig. 5 shows additional wear but with the general contour much the same except for a slight flow of metal at the back, which is occasionally seen when the head is nearly worn down to the edge of the bevel.

Fig. 6 shows a more advanced state of wear. The top of the worn rail instead of being nearly parallel to its original position, as in Figs. 4 and 5, is now sloped to the gage line to a considerable extent, and there is no very decided point of division between the top of the head and the side of the throat. The wheel flange is now running on the lip of the rail to such an extent that the bottom of the groove is considerably increased in width.

Fig. 7 shows a further increase in wear. The back of the head is worn so thin that it is beginning to bend down slightly, while the flanges have cut the throat down to below its original depth, and in consequence the lip is weakened to such an extent that it shows considerable downward bend under vehicular traffic.

Fig. 8 shows the same type of wear as Fig. 7 but to a considerably increased extent. The gage line is now worn down well toward the original bottom of the throat, the back of the rail head is considerably bent down, while the lip is so weakened by flange wear as to be decidedly bent.

Fig. 9 shows the Chicago section entirely worn out. This rail was taken from a stopping point in a very heavy traffic street, and until shortly before its removal appeared about as other well worn rail when viewed from the top. Shortly before its removal a crack appeared in the bottom of the throatway between the head and the lip. The rail was removed and found to be in the condition shown here. At the time of its removal this rail was still carrying its heavy traffic in a satisfactory manner.

In connection with Fig. 9 especial attention is called to the extra metal under the back of the head on the Chicago section. This metal does not appear in most high girder rail sections, but its great value during the later life of the rail is well brought out in this case. The combination of this metal with the rest of the metal in the head gives a section quite similar to a high tie rail such as has long been used to carry heavy cars in open track. The cutting away of the lip of the rail made it of no value in paved streets, but as far as safely carrying the cars was concerned it could still fulfill its purpose. If this metal had not been under the head of the rail the head would undoubtedly have bent down much sooner and more abruptly, and this would have left so small an amount of really useful metal in the rail head that the rail would probably have become unsafe for operation and would have been removed for this cause long before it was necessary to remove it on account of the broken lip. This rail gave about ten years of service at a stopping point on one of the heaviest lines in the city.

In the year 1921 the shape of the standard Chicago section was changed slightly, the principal difference being that the head of the rail is made the arc of a circle instead of a straight line as in the old section. This has increased the weight about 1 lb. per yard. None of this rail has been in the track long enough to show how it will work out under traffic.

By far the greater part of the

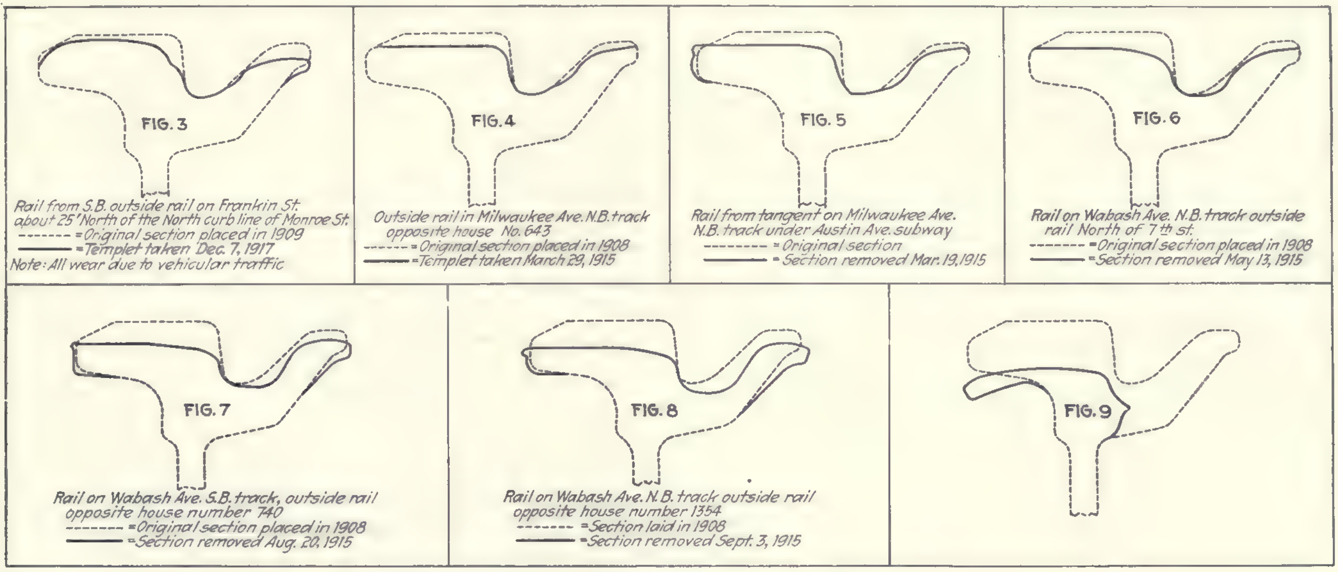


FIG. 3

Rail from S.B. outside rail on Frankin St.
about 25' North of the North curb line of Monroe St.
------- =Original section placed in 1909
——— =Templet taken Dec. 7, 1917
Note: All wear due to vehicular traffic

FIG. 4

Outside rail in Milwaukee Ave. N.B. track
opposite house No. 643
------- =Original section placed in 1908
——— =Templet taken March 29, 1915

FIG. 5

Rail from tangent on Milwaukee Ave.
N.B. track under Austin Ave. subway
------- =Original section
——— =Section removed Mar. 19, 1915

FIG. 6

Rail on Wabash Ave. N.B. track outside
rail North of 7th st.
------- =Original section placed in 1908
——— =Section removed May 13, 1915

FIG. 7

Rail on Wabash Ave. S.B. track, outside rail
opposite house number 740
------- =Original section placed in 1908
——— =Section removed Aug. 20, 1915

FIG. 8

Rail on Wabash Ave. N.B. track outside rail
opposite house number 1354
------- =Section laid in 1908
——— =Section removed Sept. 3, 1915

FIG. 9

Nature of rail wear as experienced in Chicago surface track

track laid in Chicago since 1907 has been paved with dressed granite block. The following kinds of pavement have, however, been laid to some extent: creosote block, creosote block with a granite stretcher along the rail, and vitrified paving brick.

Whenever possible the companies pave their right-of-way with redressed granite block unless the vehicular traffic is so light that a much cheaper pavement can be used. The type of granite block used has remained unchanged from 1907 to date, but the method of laying the block has been changed from time to time. The granite blocks used are 5½ in. in depth. In the earlier years of the work these granite blocks were laid on a cushion of bank sand and sealed with a pitch filler, but this did not prove to be satisfactory as the slight motion permitted in the rail, by the loosening of the fastenings used in this early track, produced a pumping action which pumped out the sand during wet weather and allowed the stone along the rail to settle. The first step taken to overcome this difficulty was to change the bedding cushion along the rail from bank sand to dry mortar and grouting the strip along each side of each rail, paving pitch being used on the portion of the track not grouted. This practice was followed for a time, but eventually the standard method came to be the use of a dry mortar bed under all of the block and all of the block grouted. This method is still followed, but asphaltic cement sometimes used replaces the cement grout.

As the companies had an immense number of old granite blocks as salvage from their old tracks, it has always been their practice to keep a force of granite block cutters at work redressing the larger and better blocks for further service. These redressed granite blocks are used on streets having lighter vehicular traffic and they have given service equal to that of new blocks in similar locations. These blocks are laid exactly as new blocks except that because of their shorter depth the concrete under them is brought up slightly higher. About six more blocks are required per square yard with redressed block than with new block.

This granite block pavement has given excellent service in every way except for the settlement along the rail previously referred to. This one trouble has been almost entirely overcome by the use of the mortar bed and cement grout or asphaltic cement binder.

The companies lay creosote block only on streets where it is required by some special ruling, as they consider dressed granite by far the best pavement. A considerable amount of creosote block pavement has been laid, however, using a block 3¾ in. wide by 4 in. deep by from 5 in. to 10 in. long. The method of laying these blocks has been exactly along the line followed in laying dressed granite block, including most of the changes in the method.

Creosote block pavement has not proved very satisfactory in the tracks, as the blocks are not strong enough to carry the heavy loads that they have had to carry when laid next to the rail. The present practice, in nearly all cases where creosote block is required, is to lay a stretcher course of granite block along each side of each rail and pave the balance of the right-of-way with creosote block.

Brick pavement has been used very little in recent years and never anywhere except on streets in the outlying districts where the vehicular traffic is comparatively light. Practically none of this pavement was laid in connection with any of the types of track described and none of it has been subjected to very severe traffic conditions.

SURFACE AND SUBSURFACE DRAINAGE PRACTICES

Almost all of the types of track and paving considered in this article are in streets that are paved from curb to curb and properly drained into the city sewers, so that there is little trouble with the water laying on the tracks. Where the tracks are laid in streets which have not yet been permanently paved, no special arrangements are made for surface drainage except that in cleaning up the streets after construction the roadway adjoining the pavement is leveled down to or a little below the level of the track.

The track is all laid with the inside rails of double track at grade and the outside rails ¼ in. lower, the pavement being laid accordingly. The pavement between tracks is crowned slightly so that the tracks naturally drain off on each side to the adjacent pavement.

Comparatively little subsurface drainage has been intsalled in Chicago. Where the subsoil is sand it is not needed, and where the subsoil is clay it has not generally been considered necessary as most of the heavy track is laid in streets that are paved from curb to curb and consequently have good surface drainage. Nearly all street railway tracks are in streets having sewers under them and these have a tendency to lower the water level below the subgrade of the tracks.

SPECIAL TRACKWORK

As brought out in the discussion of tangent track rail, the companies are required by ordinance to use a standard rail of specified section. This rail is used on all unguarded portions of 9-in. special trackwork. A girder guard rail has been designed for use on all guarded track which follows, as nearly as possible, the section of the standard tangent track rail and fishes with it. This Chicago girder guard section weighs 145 lb. per yard and is shown in Fig. 2. All curves are double guarded when the center radius is less than 500 ft., and single guarded when the center radius is from 500 ft. to 1,250 ft.

The special trackwork used on heavy traffic streets is 9 in. in depth and of four types of construction known as types A, B, C and D. These types are described in the specifications as follows:

Type A consists of 9-in. or 7-in. steel castings, into which manganese steel plates or the equivalent are inserted at points of greatest wear. The terminals are made to fish with the abutting rails by grinding to template.

Type B consists of 9-in. or 7-in. manganese steel castings, or the equivalent. The terminals are made to fish with the abutting rails by grinding to template.

Type C consists of 9-in. or 7-in. rolled-steel rails cast steel-bound or cast iron-bound construction, into which manganese steel plates or the equivalent are inserted at points of greatest wear.

Type D consists of 9-in. or 7-in. built-up special trackwork composed of rolled-steel rail sections.

All special work considered here is composed of 9-in. switches, mates, and frogs of one of these four types, connected by one of the standard 9-in. rails, or else it consists of 9-in. curved rail only. In the following discussion and tables, where all the switches, mates and frogs are of one type, the special trackwork is referred to as A, B, C. etc. Where part of the pieces are of one type and part of another the special trackwork is referred to as B & B, B & C, etc., the letters indicating the types of the special pieces in the layouts.

Table III is based on an analysis of 443, 9-in. layouts (crossovers not included) which were placed in all parts of the city by all companies during the years 1907, 1908, 1909 and 1910. These are all of the 9-in. layouts that were installed in those years, except about twenty-five that were not included due to certain special conditions that prevented their being properly tabulated with the other layouts.

In Table III the first column shows the number of layouts of each kind as described above. The record column shows the percentage that the number of layouts of each type bears to the total laid in those years. The third column shows the total number of feet of track contained in the layouts of the different types. The fourth column shows the percentage that the feet of track in the various types bears to the total number of feet.

TABLE III—STATISTICS ON LIFE OF SPECIAL TRACKWORK

Type	Number of Layouts	Per Cent of Total	Number Feet Track	Per Cent by Feet	Average Feet per Layout	Average Life of Layouts Years	Months
A	15	3.39	1,793.9	0.94	119.6	11	5
B	140	31.60	83,188.6	43.56	594.2	9	4
C	20	4.51	3,623.0	1.90	181.1	9	8
*D	105	23.70	20,301.5	10.63	193.3	10	11
A and B	103	23.25	55,264.3	28.94	536.5	10	2
A and C	4	0.90	1,575.2	0.82	393.8	9	10
B and C	48	10.84	22,565.5	11.81	470.1	9	10
B and D	8	1.81	2,682.0	1.40	335.2	10	2
Total	443	100.00	190,994.0	100.00	431.1	10	1

* Nearly all plain curve layouts.

It should be noted that the percentages as shown in the second and fourth columns differ very materially, especially in the first half of the table. The percentage by layouts is much larger for types A, C and D than the percentage by feet while the reverse is true for type B, even though type B has the largest number of layouts of the four. This is because there are not only a larger number of type B layouts but a very large percentage of them are large layouts, many of them being in the heart of the business district.

The fifth column shows the average number of feet of track in each type of layout. It was obtained by dividing the figures in the third column by those in the first column. It should not be understood, however, that the individual layouts of each type are all of about the same size, for this is not the case. Type B, for example, contains layouts varying in length from less than 80 ft. to more than 1,800 ft.

The sixth column shows the average life of layouts for each type. This life was obtained by adding up the life of all the layouts of each type and dividing by the number of layouts. The age of each layout was taken as the time from its installation to the time when the layout was sufficiently worn so that it was necessary to replace at one time at least a standard single-track crossing or its equivalent. No account is taken of any minor replacements that may have been made before or any life remaining in the layout after the renewal of an amount equivalent to or greater than a standard single-track crossing.

Of the 443 layouts considered there are a few in which the equivalent of a single-track crossing has never been renewed at one time, although several small amounts renewed at various times might, if taken together, equal that amount. These layouts are nearly all on the list of those requiring renewal in the near future, so that for the purpose of this tabulation they were considered as having been renewed as of Jan. 31, 1922. While this assumption tends to reduce the average life shown in the last column it does so to only a limited extent and has the advantage of compensating for cases where the equivalent of a single-track crossing has been removed but in such small amounts and over such a long period that the layout appears on the record as not having been renewed.

According to the data in the last column, type A shows the longest life, and the second longest life is shown by type D special work. The life of the other types ranges from ten years and two months to nine years and four months, a variation of less than one year.

While type A shows the longest life there are certain other factors that should be considered in this connection. In the first place there are only a small number of layouts (fifteen) and it so happens that with one exception they are all plain crossings and in nearly every case are placed at locations where the traffic on at least one of the streets is quite light. For this reason the traffic over them is probably lighter on the average than is the case with type B and type C, and this probably accounts to some extent for the good showing of type A.

Type D shows the second longest life, but this type also has certain special features that should be taken into consideration. The 105 layouts shown under D are nearly all plain curve layouts and in consequence do not give any idea of what the life of bolted switches, mates and frogs would be. They are shown here to give an idea of the life of curved track with bolted joints, as such track is a part of layouts of all types. It will be noted that the life of such track is greater than the life of any construction except A. There being no special pieces in most of the D layouts listed, it is somewhat difficult to determine when the amount of wear on these layouts was equivalent to a single-track crossing on the other types of layout. No exact rule was followed as the variation in the curves was considerable, but in general curves were included in the list when all of the guard section on one rail of the curve had to be renewed.

The layouts listed as part B and part D contain built-up switches, mates and frogs. The life of these eight layouts compare favorably with the other types.

On the whole the use of type B, or solid manganese construction, was greater than that of any other type. Not only were 140 layouts constructed entirely with this type but it was used in part on 159 other layouts or in 299 of the 443 layouts considered. Eliminating the plain layouts it was used in 299 of 338 layouts.

FLANGE-BEARING SPECIAL TRACKWORK NOW STANDARD

Most of the layouts considered were not flange bearing, but flange-bearing special work was later adopted as a Chicago standard. After the change to flange-bearing special trackwork had been made, the subject of a proper slope at the ends of the throatways on solid manganese plates was taken up and given careful consideration. The result of this study was a specification that gives plates considerably larger than are used in many cities but which are considered here to be a decided improvement over the smaller plates formerly used.

The following paragraph from the specification for "Throats and Flangeways" on type C insert plates gives a good idea of the way in which the size of the plate varies to fit different conditions:

> The floor of the grooves in all 90-deg. or acute-angle frogs shall be level from the guard point to the theoretical frog point and extend beyond the theoretical frog point toward the heel. The total length of the level portion of the floor shall be twice the distance from the guard point to the theoretical frog point. The floor of the grooves in all obtuse angle frogs shall be level in front of and extending an equal distance on each side of the theoretical frog point. The total length of the level portion of the floor shall be twice the distance between the points formed by the intersecting guard and gage lines. Inclines shall begin at the ends of this level portion and slope down uniformly to a depth of 1 in. at the ends of the manganese plate, the length of slope to be not less than 6 in., the intention being that the treads of the wheels will have full bearing before leaving the manganese and before the flanges engage on entering the manganese.

MANGANESE SPECIAL TRACKWORK WELDED SUCCESSFULLY

A considerable amount of work has been done in connection with building up manganese plates by means of the arc welding process. The earlier attempts were not very successful but constant study and experiment by the engineers of the Chicago Surface Lines have brought about a decided improvement. Recent experiments with a manganese coated electrode are giving great promise, some work having stood up for a number of months under exceedingly heavy traffic without any sign of failure. It is hoped that within a short time the company will have developed a process by which it can successfully keep these manganese castings and plates in proper condition.

RAIL CORRUGATION CAUSE STILL UNKNOWN

As in the case of other large cities, corrugation of the rail has been a source of considerable trouble and expense on Chicago street railway tracks. This rail trouble seems to have developed about equally on the solid concrete and ballasted types of foundation and under a great variety of traffic conditions. The period of time in which corrugation develops has varied from a few weeks to several years, and in many cases no appreciable amount of corrugation has developed at any time.

After the corrugations have developed considerably on any stretch of track they are ground off with a grinding machine which is a modified form of the Kerwin grinder.

The standard Kerwin grinders with two grinding wheels at one end were remodeled in the companies' shop by placing two similar wheels at the other end of the machine, and using the motor which formerly operated the two wheels to operate all four. The size of the driving belts was also increased and the shape of the belt pulleys changed, so that all grinding wheels now operate more uniformly and with less belt slipping than formerly. In remodeling the machines the control levers were placed on the inside of the wheels and a seat built at the end of the machine so that one man on this seat could readily operate both grinding wheels on his end of the machine. The position not only enabled the operator to handle two wheels instead of one, but placed him in such relation to the rail that he could watch his work much better than when walking alongside the machine as formerly.

The result of these changes has been that the same electrical and truck equipment now handles four grind-wheels instead of two; that the grinders are more reliable than formerly, due to the change in the belt drive; and that one man now operates two grinding wheels instead of one, and in a more efficient manner, since he is so placed that he can see his work better and is relieved of the physical strain of constantly walking at the exceedingly slow and tiresome rate at which the machine moves.

Handling the Records of 11,000 Trainmen on Chicago Surface Lines

ONE MIGHT suppose that the system for handling the records for as many trainmen as are employed by the Chicago Surface Lines would be complicated and the records themselves voluminous. The records do bulk large, of course, when all material information about each man must be kept and permanently preserved for a total of nearly 11,000 trainmen. However, the system for handling and filing these records makes them immediately accessible.

The records are divided into three groups, namely, men who are in active service, former employees, and those applying for employment. All the information pertaining to one man is placed in a jacket, alphabetically filed. Such data include the application blank, his contract with the company, his yearly record sheets, his accident record, the work sheet during his instruction period, any correspondence pertaining to him, and all necessary record papers. During a man's period of employment his name is entered on one page of a loose-leaf record book according to the division to which he is assigned.

This book is in the hands of the division superintendent and in it is entered anything arising in connection with his service as a trainman. For instance, if a complaint is received at the main office about a conductor, the letter is forwarded to the superintendent of the division in which the conductor works. The division superintendent makes a disposition of the case, a record of which is entered on his books and the correspondence is returned to the general office, where it is filed in the jacket of the employee. The division records are returned and filed yearly in each man's jacket. Thus the complete record of any trainman is available instantly at the office of the superintendent of transportation.

A similar file is kept in the employment office for all applicants. In this case the principal record is the application blank and the references from former employers. Last year 4,808 were allowed to file such applications.

RECORDS OF FORMER EMPLOYEES KEPT IN FILES

The record of a trainman who has left the service is removed from the active files and after all papers in regard to terminating his connection with the company are included, the complete jacket is placed in the inactive files in the office vault. Records of former employees are held in the main office as long as the space permits and then the older ones are removed from the files for permanent storage.

It is often necessary to know quickly whether a man is in the company's employ, or has filed an application, or has terminated his connection. For this purpose a card index is kept for ready reference.

"Educating the Public" in Chicago

Large Newspaper Display and Expert Copy Found to Be Inefficient and Ineffective — Reaching the Car Riders Direct with Brief Messages Has Proved to Be More Valuable Publicity, but the Trainmen Offer the Best Entree to Public Good Will

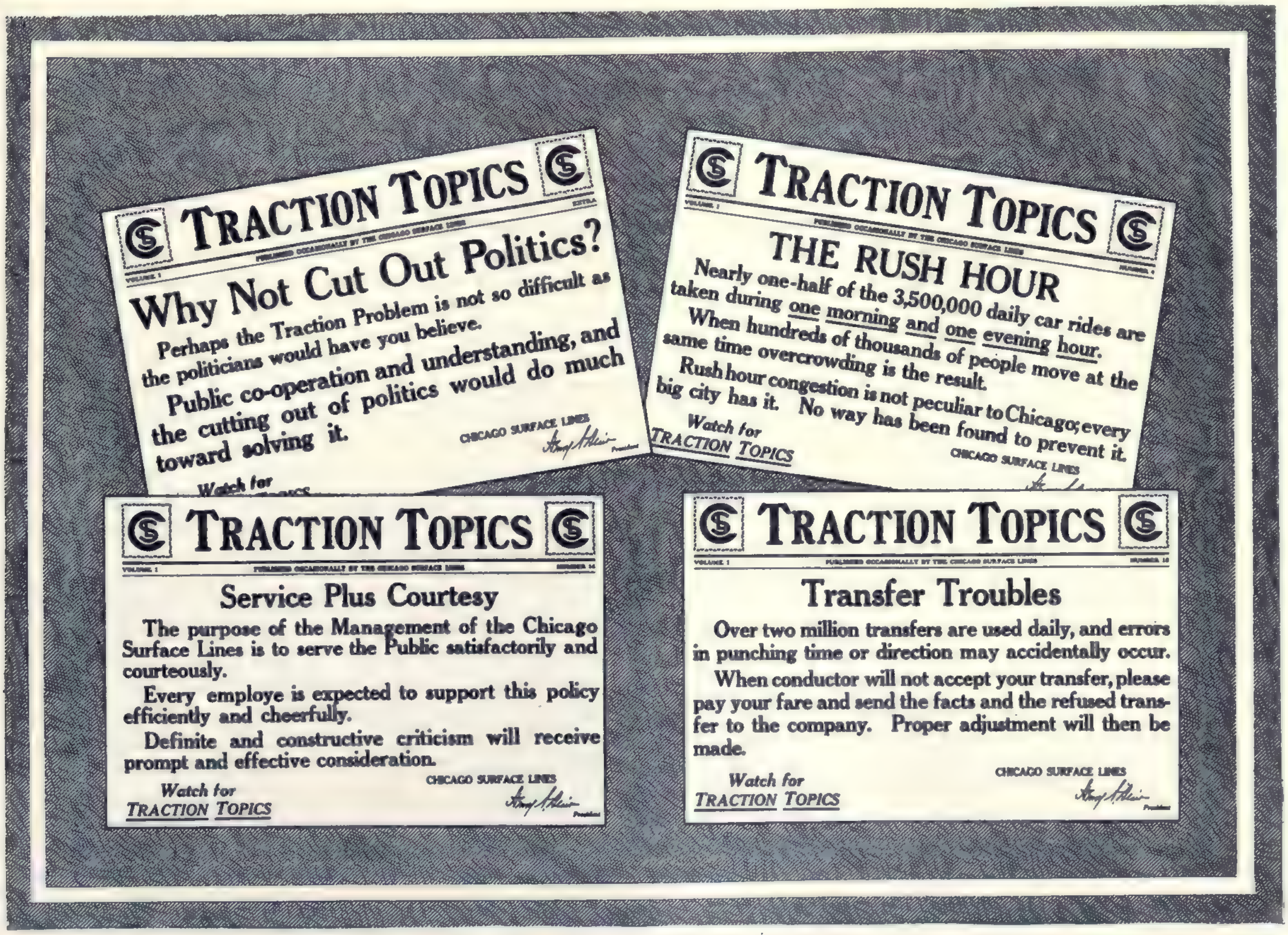
By JOHN E. WILKIE
Vice-President Chicago Railways Company

THE Chicago Surface Lines has had a very interesting, and more or less illuminating, experience with "educational publicity." Its experiments in this field have been conducted with the able assistance of "crowd psychologists," "advertising engineers," publicity experts and common, or garden variety, honest-to-goodness advertising men.

It has experimented with pages and half pages of the "knock-their-eyes-out" variety; quarter pages three times a week; eighty lines, three columns wide, every day; straight reading matter, with and without individual fancy and plain borders, and everything in the way of topographical ingenuity that might be suggested by the skilled, confident and enthusiastic gentlemen who at the moment might be in charge of the mechanical details.

The writer, as a former newspaper man, though not identified with the advertising department, was favorably inclined to this character of publicity as the best method of "educating the public" and creating and crystallizing a friendly public sentiment, but he confesses, with some reluctance, that after several years activity in this particular direction the results have fallen far short of the rosy predictions and confident assertions of the experts. And he has reached the somewhat disappointing conclusion that a sympathetic public sentiment cannot be manufactured by any of the foregoing methods. At least not in Chicago.

It is quite conceivable that in a wide territory embracing small towns and large agricultural areas, where the county seat newspaper is carefully read from the first column on the first page to the last column of the last page, and thoroughly digested, there is a field which may be



TRACTION TOPICS
VOLUME 1 PUBLISHED OCCASIONALLY BY THE CHICAGO SURFACE LINES EXTRA

Why Not Cut Out Politics?

Perhaps the Traction Problem is not so difficult as the politicians would have you believe.

Public co-operation and understanding, and the cutting out of politics would do much toward solving it.

CHICAGO SURFACE LINES

Watch for

TRACTION TOPICS
VOLUME 1 PUBLISHED OCCASIONALLY BY THE CHICAGO SURFACE LINES

THE RUSH HOUR

Nearly one-half of the 3,500,000 daily car rides are taken during one morning and one evening hour.

When hundreds of thousands of people move at the same time overcrowding is the result.

Rush hour congestion is not peculiar to Chicago; every big city has it. No way has been found to prevent it.

Watch for TRACTION TOPICS

CHICAGO SURFACE LINES

TRACTION TOPICS
VOLUME 1 PUBLISHED OCCASIONALLY BY THE CHICAGO SURFACE LINES NUMBER 14

Service Plus Courtesy

The purpose of the Management of the Chicago Surface Lines is to serve the Public satisfactorily and courteously.

Every employe is expected to support this policy efficiently and cheerfully.

Definite and constructive criticism will receive prompt and effective consideration.

Watch for TRACTION TOPICS

CHICAGO SURFACE LINES
President

TRACTION TOPICS
VOLUME 1 PUBLISHED OCCASIONALLY BY THE CHICAGO SURFACE LINES NUMBER 10

Transfer Troubles

Over two million transfers are used daily, and errors in punching time or direction may accidentally occur.

When conductor will not accept your transfer, please pay your fare and send the facts and the refused transfer to the company. Proper adjustment will then be made.

Watch for TRACTION TOPICS

CHICAGO SURFACE LINES
President

A few samples of the pithy messages told the public in the street cars intensively cultivated by a railroad or other utility and satisfactory results achieved. A campaign of this character, which has been a scintillating success, I believe, is the one which President Charles Markham of the Illinois Central Railroad has conducted throughout the territory served by his lines.

But our experience, if it means anything, means that the Chicago public, or a very considerable part of it at least, is "hard boiled," cynical and suspicious. This section of the community seemingly accepts with enthusiasm and gives credence to any and every charge against a utility that may be voiced by a self-seeking politician and refuses to take any interest in or be convinced by evidence submitted in courts of record or before commissions, even though that evidence demonstrates the falsity of the wild assertions of the demagogues.

There is another element to be taken into consideration in Chicago. It is a high-pressure community and the readers of newspapers seem to have time only for a glance at their morning and evening daily. Many of them are devotees of particular sections of the paper. They read all of the news in the department in which they are especially interested and give to the remainder of the paper only a hurried and casual once over.

DEFINITE CHECK ON HOW MANY READ RAILWAY AD

A complete confirmation of this fact was obtained by a little research work a few years ago, following the publication in all of the morning and afternoon papers of a page display relating to a phase of the transportation situation which was rather acute at the time. Our representatives called at every room in three of the largest downtown office buildings and asked two questions: "Did you read the Surface Lines' ad printed in yesterday's afternoon and today's morning papers?" and "How did it impress you?" Out of more than 3,000 individuals who were called upon only about 300 admitted having seen the advertisement, and of those 300 less than 100 had read it. Of those who had read it the majority reached the conclusion that its publication was merely an attempt on the part of the utility to secure the support of the newspaper by buying a large amount of space.

It was these experiments that led to a different, very much less expensive and what has proved thus far to be a much more satisfactory publicity policy. We concluded that the public in which the companies were most interested was the army of car riders. Something more than 1,000,000 people ride twice daily on our lines. Counting each fare-paying passenger and each transfer passenger as a car rider, we had a total of 3,500,000 riders daily. Using the phraseology of the advertising men, here was a "circulation" of 3,500,000 to whom a direct appeal might be made within our own vehicles.

We, therefore, began the publication and display, in 20½x13½-in. poster form, of *Traction Topics*, two copies of which were attached to the windows in opposite corners of the car during the cool weather, and with the approach of summer the form was changed to a card printed on both sides, suspended from the roof over the center aisle. The text was restricted to forty or fifty words.

INFORMATION RATHER THAN PROPAGANDA

We abandoned any attempt to "manufacture public sentiment" and devoted ourselves to creating an interest in the property by featuring facts which might appeal to the imagination of the reader or give him something to quote in the way of easily remembered and striking statistics. Most of these related to such simple matters as the number of employees, cars and their cost, magnitude of the transfer business, distribution of riders during the rush and non-rush hours, cost of lighting and heating the system, track mileage, and so on. Interspersed with information of this character were brief statements relating to the uses of transfers, what to do when conductors questioned the validity of transfer slips, how to avoid controversy of one sort and another and similar matters disclosed through the correspondence in files of the complaint department. Several of the posters are reproduced herewith to give an idea of the matters touched upon in *Traction Topics*.

We have daily evidences that *Traction Topics* is widely read, and among other things emphasized by the correspondence from our readers is that the complaint department of our organization is the real barometer of public sentiment. Your treasurer can tell you your exact financial status; your auditor can give you tabulated information about your revenue passengers, car-miles, car-hours, maintenance costs, and so on. But when you want to know how you stand with the public, consult your complaint department.

Nobody knows better than the public utility official that relations with the public are not established by the amiable resolutions or intentions of the management. The real factor in the development of a friendly public spirit is the platform man. Upon his treatment of his passengers, upon his smile or frown, upon his courtesy or incivility, depends the real sentiment of the car-riding public. And this being admitted, it at once becomes evident that in establishing satisfactory relations with the public, nothing is more important than a complete understanding and co-ordination between the complaint and the transportation departments of a great system. One conductor with a grouch can do more to destroy friendly inclination on the part of the company's patrons than the management can do to build up such inclination by a long period of sincere effort and service.

PUBLIC RELATIONS A MATTER OF EMPLOYEE RELATIONS

In these days, where liberty is taken with even national laws, and there is a spirit of resentment toward restraint of any character, one recognizes that the problem of dealing effectively with offending employees is becoming increasingly difficult. But the writer believes that no public utility can secure either public sympathy or support through any form of publicity unless and until it has educated its trainmen to understand that the reputation of the company is in their hands, and that the disciplinary policy of the organization is sufficiently effective to drive this truth home.

It would therefore seem to be wiser, perhaps, to devote the educational activities of the utility companies to the men who are under their control, rather than attempt to "educate the public." For a properly educated employee can do more in an educational way with the patrons of the company with whom he comes in daily contact than the companies can accomplish with acres of newspaper space, gallons of printer's ink and the expenditure of thousands of dollars in advertising appropriations.

Considerations which have established a power supply unique for degree of reliability and low cost are related. Features of power contract and the engineering determinations embodied in the a.c. and d.c. systems are given in connection with the

Development of Unified Power Supply and Distribution Systems in Chicago

By RALPH H. RICE
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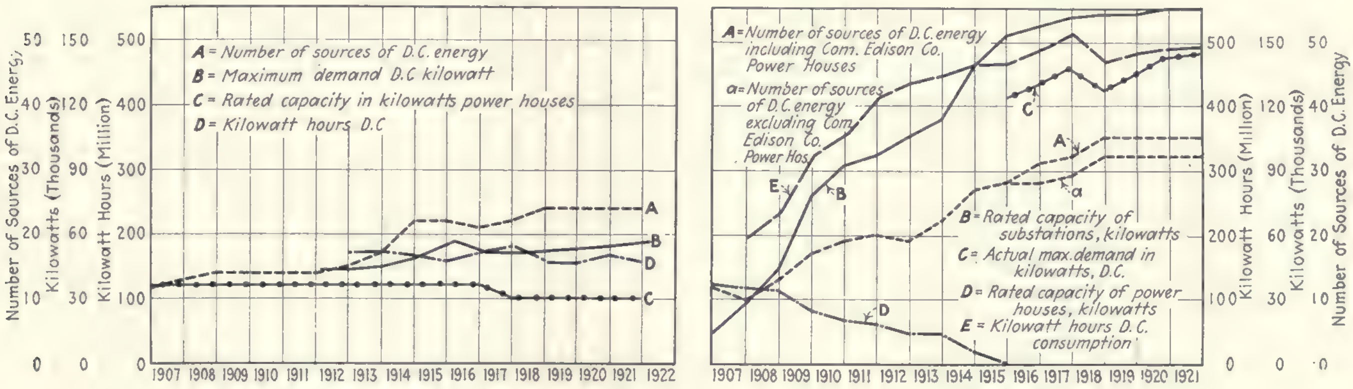
IN THE EARLY DAYS of street railway history in Chicago, all the functions of a power system were performed by horses. The cable system was then introduced and brought its own power problems and troubles, which, like the horse car, are now only memories. Steam power was used on some of the elevated lines, but like the surface lines this has given way entirely to electricity. In a later period all of the elevated lines and most of the surface lines were electrified and operated from steam generating stations providing current at trolley voltage. At that time there were a number of independent companies operating in different parts of the city and having overlapping territories to some extent. Each power system was separate from all others, and there was the usual inefficiency of small plants and duplication and overlapping of distribution lines.



Elevated Railroads

Surface Lines

Fig. 1—Growth of power producing equipment and demand of Chicago local railways

The first great step in advance was in 1907, when most of the independent surface lines were consolidated into two large systems and each of these companies entered into partnership with the city of Chicago. These consolidations were authorized by contract ordinances made between the companies and the city, and provided for a complete rehabilitation of all the properties. This afforded an excellent opportunity, and in fact the necessity, for considering the whole power situation. These ordinances created the Board of Supervising Engineers, whose duty it was to interpret the ordinances, establish standards of construction, prepare plans and specifications and supervise construction and expenditures.

One of the earliest problems confronting the board was to make a decision between purchasing energy from a central station company or producing it in the railway companies' own plants. At that time a number of street railway steam plants were in operation, and the question involved an extension or ultimate scrapping of such steam plants. This question was quite thoroughly studied and a decision was finally made to purchase from the central station company under contracts covering a period of years, and to abandon the steam stations at the earliest practicable date.

At that time the Commonwealth Edison Company was well established in the central station field and was seeking a more diversified load. It was furnishing some energy to the separate railway companies, but the acceptance of the ordinances by the surface line companies necessitated very extensive and rapid increase in the mileage and equipment of their lines, with a consequent demand for additional power equipment. By the purchase of energy the railway companies would be relieved of the necessity of constructing and operating new generating plants to extend or supersede those in use, and this was an item of considerable importance when the railway companies were burdened with such an enormous rehabilitation program. If the central station company could make attractive rates there seemed to be an advantage on both sides. As a result of the study made along this line the decision was finally made to purchase all energy and ultimately to abandon the railway's steam station.

The purchase of power from the Commonwealth Edison Company is based upon contracts made between the Chicago Railways Company and the power company and between the Chicago City Railway Company and the power company. Similar contracts are in effect between the elevated railway companies and the C. E. Co. In the early years of the rehabilitation work such contracts were entered into and purchase of power was made under them until 1912 and 1919, when new contracts were made. In both cases, these were made retroactive to Aug. 1, 1909. They involved several features not in the original contracts, such as a sliding primary and secondary scale, provision for change in rate with change in price of coal, provision for limitation of maximum demand in very cold weather, and changes in location of measuring the energy furnished. Subsequently additional contracts were made between the C. E. Co. and each railway company in which they mutually agreed to convert energy for the use of the other. These latter contracts involved only conversion and not the purchase and sale of energy.

In 1913 the Commonwealth Edison Company took over the generation of energy and operation of all substations of the elevated lines, these lines having been joined into one operating organization in 1911. By this arrangement it became necessary for the Edison Company to furnish direct current to the elevated railways. It was also evident that economies would be effected if energy for the elevated roads could be secured from some surface railway substations, and some energy for surface railways from elevated railway stations. As a result of such an arrangement a very satisfactory power supply system has been developed. Its chief operating merits are its reliability and the elimination of overlapping territories in which several independent systems of power supply are situated.

The power contracts and the conversion agreements result in several operating conditions which are interesting. These may be enumerated as follows:

1. Railway company buys a.c. energy.
2. Railway company buys d.c. energy.
3. Railway company converts a.c. to d.c. for Commonwealth Edison Company.
4. Railway company operates joint substations with the Commonwealth Edison Company.

In the first case the railway company owns and operates its own substations and purchases a.c. power at the substation, under the terms of the contract.

In the second case the railway company purchases d.c. power from the Edison Company at stations owned and operated by the latter. In this case the railway company buys the a.c. power under the terms of the contract, and in addition pays for the conversion to d.c. in accordance with the conversion agreement. The companies divide the operating expenses of the substation in proportion to the output used by each.

In the third case the railway company furnished direct current to the Edison Company from stations owned and operated by the railway company. The railway company receives from the power company only a conversion charge, as the a.c. energy furnished to the substation for the Edison Company is not included in the bill to the railway company. As in the second case, the operating expenses of the substation are divided in proportion to the output to each company.

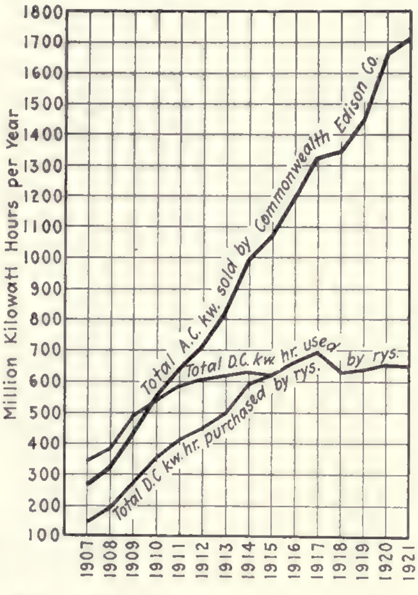


Fig. 2—Energy supplied to railways and total load of Commonwealth Edison Co.

In the case of joint substations now in operation the Commonwealth Edison Company owns the land and building and the machinery for its own output. The railway company owns the equipment for its own output and buys a.c. energy from the Edison Company. The operating expenses are also divided in proportion to the output of the two companies.

These contracts extend to the date of expiration of the railway company franchises, Jan. 31, 1927. The rates are composite, having a primary charge covering fixed charges on investment, taxes, insurance and depreciation based upon the maximum demand for energy, and a secondary charge proportional to the actual cost of production comprising fuel, labor and supplies and based upon the energy actually used. Both of these charges have a sliding scale; that for the primary charge is as shown in table above.

	Per Kw.
Up to and including 30,000 kw. maximum demand	$1.25
Over 30,000 and including 60,000 kw.	1.00
Over 60,000 and including 90,000 kw.	0.91⅛
Over 90,000 and including 120,000 kw.	0.87½
Over 120,000 kw.	0.83¼

The secondary charge is, monthly, up to and including 5,000,000 kw.-hr., at the rate of 0.4 cent per kw.-hr.; over 5,000,000 and up to and including 10,000,000 kw.-hr., 0.395 cent per kw.-hr.; and then reducing by 0.005 cent per kw.-hr., for each additional block of 5,000,000 kw.-hr. or fraction thereof, to a minimum of 0.36 cent per kw.-hr. for all energy above 40,000,000 kw.-hr. per month.

To ascertain the monthly maximum demand, the Commonwealth Edison Company selects any three consecutive days and takes the maximum hourly demand during the morning and evening peaks for these three days. The average of these six peaks is taken as the maximum demand. Of course the Edison Company selects the three days which produce the highest maximum. The maximum demand as thus determined becomes permanent until exceeded by a larger one. A new maximum established in the winter months holds over the succeeding summer period when the actual demand is much less.

The computation of the maximum demand is somewhat involved as it is evident there may be several maxima. These are:

A—The main a.c. maximum at railway company stations or joint substations, due to purchase of a.c. power.

B—The a.c. maximum due to the direct current purchased by the railway company at Commonwealth Edison Company stations.

C—The a.c. maximum, due to energy converted for the Commonwealth Edison Company at railway substations.

The maximum demand upon which the primary charge is paid, or the "billing maximum," is the total resulting from adding A and B above and deducting C. This result is the total demand by the railway company for energy used by it. In determining this the three successive days which produce the greatest resultant total are selected, and of course the values of A, B and C are simultaneous maxima. But the cost of conversion to be paid by the railway and the Edison Company is based upon the actual maxima required for conversion, and these may not be the same in amount or coincident in time with the values used in determining the billing maximum for alternating-current energy as previously explained.

There is one condition which may affect the primary rate and one the secondary rate. When the temperature falls to 15 deg. F., or lower, the excess over the previously established maximum is not to establish a new maximum to be paid for at the above primary rates, but the excess is to be paid for at the rate of 25 cents per kw. per day.

The secondary cost is dependent upon the cost of coal and this is recognized by a provision in the contract, that when the price of coal exceeds $1.90 per ton delivered, there shall be an increase in the secondary charge; and if the price falls below $1.40 per ton there shall be a decrease in the secondary charge. This adjustment may be made every two years. The amount of adjustment in dollars is obtained by dividing by 1,000 the number of kilowatt-hours used during the two-year period, and multiplying the quotient by the difference between the average coal price and $1.90, if an increase, and $1.40, if a decrease.

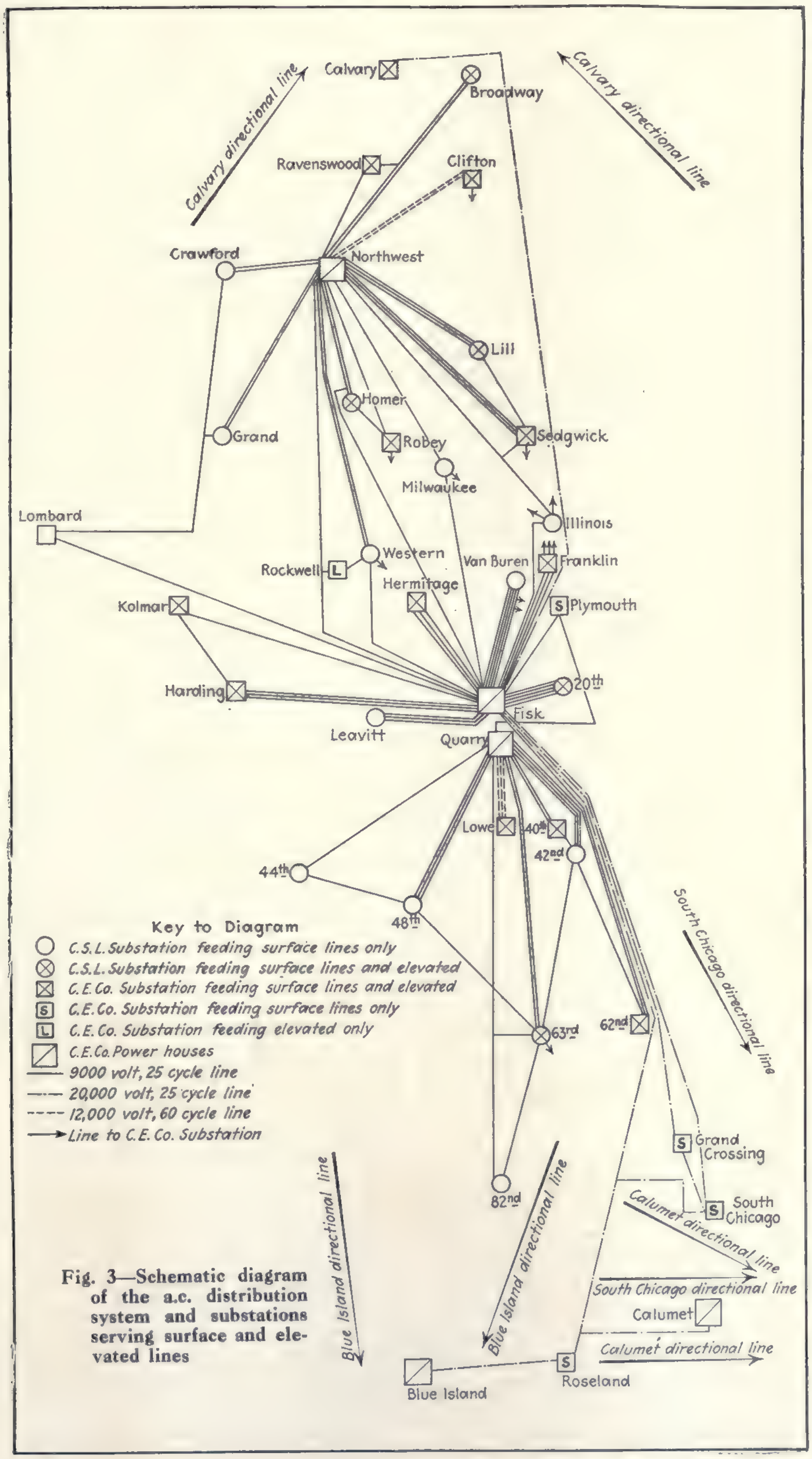

Calvary
Broadway
Calvary directional line
Calvary directional line
Ravenswood
Clifton
Crawford
Northwest
Lill
Homer
Grand
Robey
Sedgwick
Milwaukee
Lombard
Illinois
Western
Van Buren
Franklin
Rockwell
Hermitage
Kolmar
Plymouth
20th
Harding
Fisk
Leavitt
Quarry
Lowe
40th
42nd
44th
48th
South Chicago directional line
Key to Diagram
○ C.S.L. Substation feeding surface lines only
⊗ C.S.L. Substation feeding surface lines and elevated
☒ C.E.Co. Substation feeding surface lines and elevated
S C.E.Co. Substation feeding surface lines only
L C.E.Co. Substation feeding elevated only
◪ C.E.Co. Power houses
—— 9000 volt, 25 cycle line
—·— 20,000 volt, 25 cycle line
---- 12,000 volt, 60 cycle line
→ Line to C.E.Co. Substation
63rd
62nd
Grand Crossing
82nd
South Chicago
Blue Island directional line
Blue Island directional line
Calumet directional line
South Chicago directional line
Calumet
Calumet directional line
Blue Island
Roseland

Fig. 3—Schematic diagram of the a.c. distribution system and substations serving surface and elevated lines

The conversion agreement stipulates that both the railway company and the Edison Company shall pay for conversion from a.c. to d.c. on the basis of 23 cents per kw. up to and including 10,000 kw. and 18 cents per kw. for all in excess of 10,000 kw. This is a conversion charge only and does not involve the initial cost of the energy. The Edison Company owns and operates all high-tension lines between power houses and substations. Meters are placed at each substation on the incoming high-tension lines for measuring the maximum demand and consumption, and all a.c. energy is purchased by the railway company upon the basis of readings of these meters.

In stations furnishing energy to both the railway company and the Edison Company the operating expenses each month are borne jointly by the two companies, the division being determined by the energy received by each. If the output of the station is all d.c. divided between surface lines and Edison Company for elevated railway use, then the division of expense is made simply on the basis of kilowatt-hours delivered to each. However, if the output is direct current to the surface lines and alternating current of a higher voltage to the Edison Company for general power purposes, then the division must be made on the basis of equivalent alternating-current energy. The railway output in d.c. kilowatt-hours is divided by the efficiency of conversion to get the equivalent a.c. kilowatt-hours. The actual efficiency of conversion for each station is used, which averages 93 per cent. The output to the Edison Company is likewise divided by a conversion factor to reduce it to an equivalent alternating-current value. From some stations energy is furnished to the surface lines, to the Edison Company for elevated railway use, and to

TABLE I—SUMMARY OF RATED CAPACITY OF GENERATING STATIONS

In Service December 31, 1921

		600 Volt D.C.		9,000 Volt-25 Cycle		12,000 Volt-60 Cycle		Total	
No. of Station	Date Erected	No. of Units	Kilowatts	No. of Units	Kilowatts	No. of Units	Kilowatts	No. of Units	Kilowatts
Fisk Street				12	180,000	2	50,000	14	230,000
Quarry Street	November, 1908			4	56,000	2	28,000	6	84,000
Northwest[1]	July 1912			3	85,000	3	80,000	6	165,000
Calumet	December, 1921					1	30,000	1	30,000
Grove Street	October, 1913					4	14,000	4	14,000
Blue Island	August, 1917					2	*15,000	2	15,000
Fortieth and State Streets	October, 1913	9	15,000					9	15,000
Fullerton Avenue	October, 1913	7	5,000					7	5,000
Loomis Street	October, 1913	5	8,000					5	8,000
Total Generating Capacity		21	28,000	19	321,000	14	217,000	54	566,000
Edison substation batteries, kilowatt capacity at one-hour rate									23,650
Elevated railway batteries kilowatt capacity at one-hour rate									6,800
Purchased energy under contract from Public Service Company									5,200
Actual generating capacity in service Dec. 31, 1921									601,650
Additional capacity added to Calumet station in 1922									30,000
Total									631,650

* The total capacity of units 6 and 7 at Blue Island is 25,000 kw. but 10,000 kw. has been leased to the Public Service Company.

[1] No. 1 at Northwest Station has two armatures and may be used either as a 25- or 60-cycle machine. At present it is operating as a 60-cycle unit.

the Edison Company for general power purposes. In such cases the railway company pays its share of the operating expense resulting from the division as outlined.

To provide for the demands for power the Commonwealth Edison Company has constructed very large steam generating stations, and each station when constructed was of the most advanced type. Fisk Street station opened in 1903, Quarry street in 1908, Northwest in 1912 and Calumet in December, 1921.

In addition to these plants the company also operates several smaller steam stations and has also some direct-current stations, for elevated railway use principally, and some storage-battery capacity. Table I shows the total generating capacity of the system. It will be noted that both 25 and 60-cycle current are produced.

The four main stations represent an investment of approximately $44,000,000. In addition to this there is about $16,000,000 invested in substations and about $40,000,000 in transmission and distribution lines and cables. Additional investment in other items add several more millions, so that approximately $118,000,000 has been invested in the physical plant to provide electric power and light service in Chicago.

The growth of business of the Commonwealth Edison Company has been rapid and regular, as shown in Fig. 2. The alternating-current kilowatt-hours sold have reached the enormous total of 1,700,000,000 per annum, and of this amount 770,000,000, or 45 per cent, are for railway use. In 1907, both the railway and total loads were much less, and the railway load was then 55 per cent of the total. The decrease in per cent has been due to the steady growth in the retail and wholesale light and power loads, which in recent years have exceeded the railway growth. However, the railway load for surface and elevated lines is the largest carried by any one central station system in the world.

The portion of the total load used by the railways, converted to direct-current kilowatt-hours, is also shown in Fig. 2. It will be noticed that the railway load in 1907 exceeded the total of the Commonwealth Edison Company. At this time and up to 1915 the railway companies generated a portion of their own energy. The lower curve shows the kilowatt-hours purchased from the Commonwealth Edison Company from 1907 to date. The difference between the curves represents the energy produced by the railway companies in their own stations. In 1915 the last railway generating station was shut down and from that date on the two curves coincide.

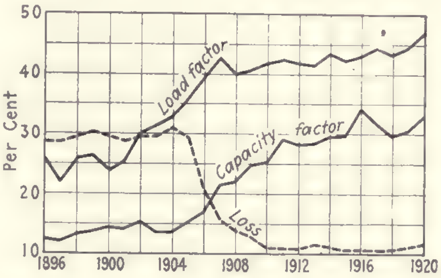


Fig. 4—Load factor and capacity factor of Commonwealth Edison Company

Fig. 1 shows the growth of power-producing equipment and demand for both the surface and elevated lines. The curves show the increase in number of stations, their rated capacity, the maximum demand and the kilowatt-hours produced. The lower curve reducing in value to zero in 1915 shows the decrease in the rated capacity of the railway steam stations. Totals from Fig. 1 have already been shown in Fig. 2.

One of the chief aids in developing energy cheaply is to increase the load factor by building up a load in the off-peak periods of the day and year. The diversified use of electrical energy has been so carefully developed by the Commonwealth Edison Company that they have increased their load factor as shown by the curve in Fig. 4.

In an address by Samuel Insull, delivered at Princeton University in December, 1921, he showed the economic advantage of interconnected systems and diversified load. For comparative purposes the maximum winter day load of the Commonwealth Edison Company in 1902 was prorated on the basis of the maximum winter day load in 1920, and the result showed an increase in the daily load factor from 42.4 per cent to 56.5 per cent. The "capacity factor" of the power system, that is, the ratio of the average kilowatts sold for the year to the capacity has been improved from about 12.5 per cent in 1896 to 33 per cent in 1920. From an economic standpoint, the capacity factor is a better basis for comparison than the load factor, because the fixed charges are based upon the investment in capacity and not upon the power demand of the customer. The improvement in capacity factor is largely the result of adding railway and industrial load, which has increased the load factor and reduced the losses.

HIGH-TENSION DISTRIBUTION BY POWER COMPANY

The Commonwealth Edison Company owns and operates the high-tension lines from the generating stations to the substations. Fig. 3 is a sketch showing the high-tension distributing system from the generating stations furnishing energy to the railway companies, the Calumet station not yet supplying any railway load. There is shown the ownership of the substations and the number of lines supplying each station. All railway supply was formerly at 25 cycles, but the 60-cycle supply is being developed and some of the railway load is very satisfactorily carried on these 60-cycle lines. The earlier transmission voltage was 9,000, but the longer lines were subsequently operated at 20,000. The existing 60-cycle railway transmission is at 12,000 volts but a transmission voltage of 33,000 is in use from the new Calumet station. All transmission is by three-phase underground cables. Fig. 4 also shows the ownership of the substations and the disposition of the energy furnished from each.

One of the most important features about this high-tension transmission system is the provision made for the continuity of supply. It will be noticed from Fig. 3 that every substation has at least two lines supplying it, and most of them have several more. In addition to direct lines from the generating stations, the various substations are tied together by lines which may furnish an energy supply regularly or only under emergency conditions. There are also provided ties from these railway stations into other Commonwealth Edison Company substations used for general service other than railway. As a result of this thorough interconnection and the reliability of the generating plants a general interruption to service is absolutely unknown and local interruptions are rare.

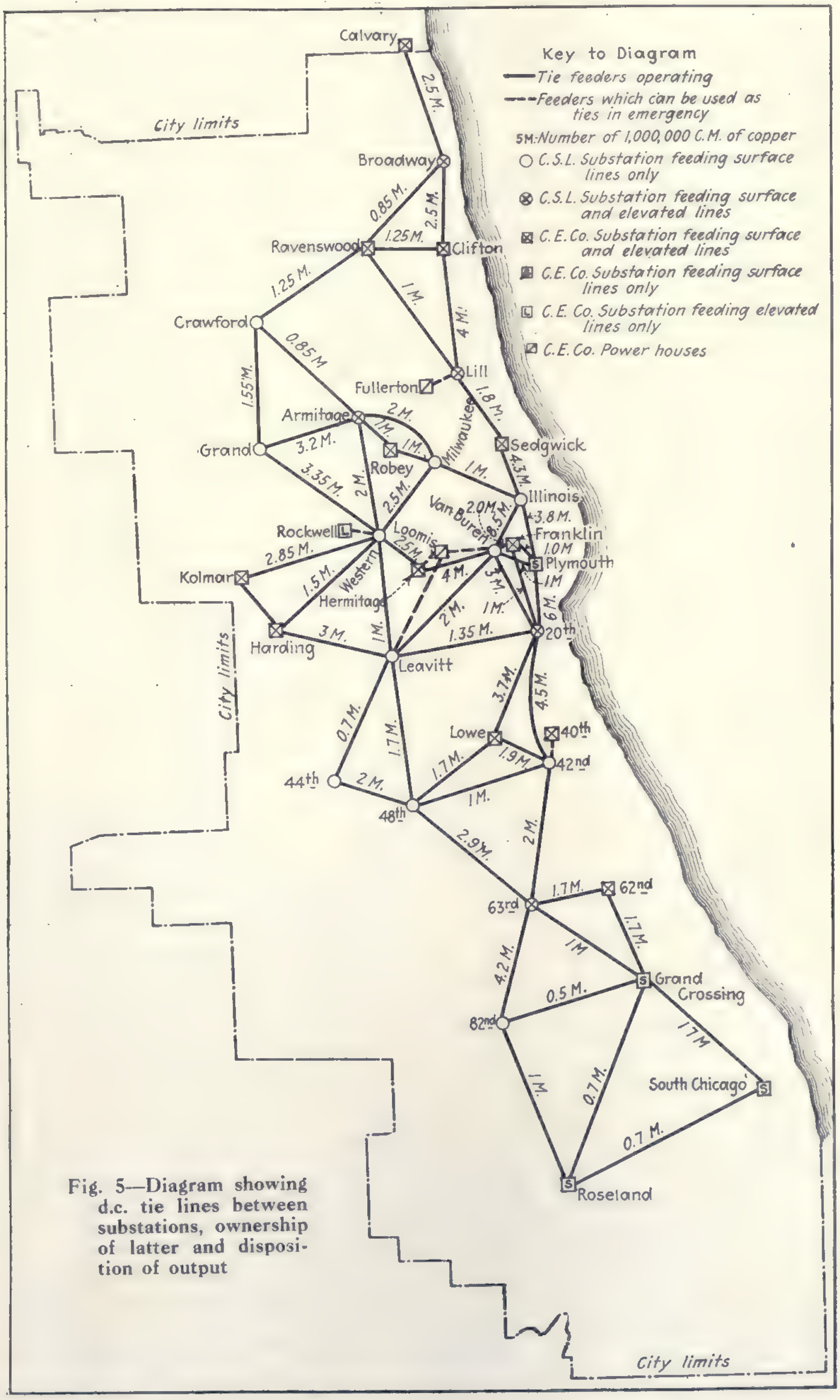


Fig. 5—Diagram showing d.c. tie lines between substations, ownership of latter and disposition of output

The practice in Chicago has been to consider the location of substations first from a general knowledge of where they are most needed on the system. The trolley sections to be put on the new station are then chosen and a graphical calculation of the load center is made by finding the combined "center of gravity" of these loads. If the station location is not the most economical for distribution of copper, studies are made of comparative costs for other locations where company property is available or where real estate may be obtained to advantage. It is found practically that new stations are rarely located where theoretical requirements would indicate.

Chicago substation equipment has become quite standardized and various installations differ chiefly in arrangement of minor details. In the earlier installations traveling cranes and heating equipment were provided. The crane has been omitted in the later stations, as the standard modern machinery is so reliable that it is rarely necessary to make replacements of parts requiring the use of a crane. In fact, the Chicago companies were among the first to omit the crane. Not only does this avoid the investment in a crane, but the building may be made lower and the side walls somewhat lighter, thus making an additional saving. Frequently no heating plant is installed as the waste heat energy from the machines is sufficient to give a comfortable working temperature. The rotary converters used in the early substations were of 1,000-kw. capacity, but the 2,000-kw. unit soon became standard, and was in turn superseded by the 3,000 and later by the 4,000-kw. size. Sixty-seven rotary converters are now in use, divided as follows:

Twelve 1,000-kw. units
Two 1,200-kw. units
Forty-one 2,000-kw. units
Two 3,000-kw. units
Ten 4,000-kw. units

All of the latest stations have

4,000-kw. units. The cost of these large machines is less per kilowatt and they occupy but little more space in the substation, making the square foot area per kilowatt much less than formerly. It is possible to place a 4,000-kw. unit on the same foundation as occupied by a 2,000-kw. unit. Care in design has made this improvement possible, and the later machines contain numerous refinements in design, which in the aggregate improve this class of machine very materially. Standardization of sizes has also permitted the use of standard switchboards, transformers and other auxiliary equipment, and a reduction in spare parts required.

Fig. 5 shows the thirty-four substations furnishing energy to the local lines. In addition to these there is one storage battery station; and also at Plymouth Court substation a battery is in service with rotary equipment. The elevated railway system receives its energy from some of these stations and has in addition two battery stations available for special demands. The ownership of each station and the disposition of its energy output is indicated in Fig. 5. Only the Edison Company stations which furnish energy to the railway systems are shown. Table II gives this information in a more convenient form.

TABLE II—OWNERSHIP AND USE OF SUBSTATIONS

Ownership	Number of	Stations	Used by
	C. E. Co.	C. S. L.	Elevated
Commonwealth Edison Company Stations			
1. General, light and power only	41	..	..
2. Elevated only	2	..	2
3. Chicago tunnel	4	..	..
4. Surface and elevated	11	11	11
5. Joint stations, with surface equipment	4	4	..
Surface Lines Stations			
6. Surface only	..	11	..
7. Surface and elevated	..	5	5
8. Battery station	..	1	..
Elevated Lines Stations			
9. Battery stations	..	..	2
10. Elevated and C., N. S. & M. Ry.	..	..	1
Total substations	62	32	21
Steam stations operated by Commonwealth Edison Company	3	3	3
Total stations	65	35	24

The surface line railways have an investment in substation property now in service of about $4,750,000, of which $3,500,000 is in station equipment and the remainder in buildings and real estate.

In Chicago the trolley line is sectionalized by section insulators and each section is fed from a separate feeder panel in the substation. This feeder is often composed of several cables running by different routes and tapping in at different points to a distribution cable on the street, from which feed taps are made to the trolley wire. This "radial" system of distribution is not so economical of copper as a "network" system, in which all the trolley wires form a continuous network and the feeders furnish energy to selected points of the network. But it is difficult to locate trouble in an extensive network of this kind and also difficult to isolate the portion in which the trouble occurs. Some effort has been made in Chicago to utilize the advantages of a network with the radial system by joining adjacent trolley sections through fuses or circuit breakers. Such a method has not been found satisfactory, because it was impossible to adjust the connection so that it would distinguish between a heavy transfer of current from one section to another due to a shift of load (which it should allow) and a heavy flow of current into a section due to short circuit (which it was not intended to permit). The practice at present, therefore, is to provide knife switches, mounted in a pole box, which are normally open, but which may be closed on each end of a section if for any reason the feeders to this section become disabled. Such a plan provides a quickly operative and convenient device for insuring continuity of service, as it is quite unlikely that both the sections adjacent to a disabled section would also be out of service.

In the central portion of the city all feeders are in ducts underground, with laterals up poles for feed taps to the trolley. In the outer portions of the city all distribution is by overhead lines, with a jumper connection to the feed span. All cables are rubber insulated. The clamps holding the weatherproof riser to the pole have an insulating band between them and the pole, and the cable is held in the clamp by a split insulator. This gives three insulations between the conductor and the pole and practically prevents "hot poles."

The basis upon which the positive and negative feeder systems were to be computed was established by the Board of Supervising Engineers. That for the positive system is as follows:

1. The d.c. bus at substations will be operated at approximately 600 volts.
2. An allowance of 40 kw. in substation capacity will be provided for each standard double truck car or its equivalent operated. (The standard car then weighed approximately 26 tons light.)
3. In calculating copper for current-carrying capacity an allowance of 75 amp. per standard car shall be allowed.
4. An average drop of 50 volts will be allowed between the d.c. busbars and the center of load of each trolley section, due provision being made for the lines to take care of emergency cases.
5. The carrying capacity of insulated cables shall be calculated upon the following basis:

In arriving at the basis for kilowatt and ampere requirements extensive tests were made on individual cars in actual operation in different kinds of service. Tests were also made upon groups of from eighteen to seventy-six cars operating on isolated trolley sections of a mile or more in length, by stationing observers to note the cars entering and leaving the section and to take current and voltage readings on the section feeders. The values finally decided upon included requirements for heat and light and operation under winter conditions. The methods of test and computation are fully described in the second annual report of the Board of Supervising Engineers (1908), and in a paper by the writer on "Low Tension Feeder Systems for Street Railways" (Jour. West. Soc. Eng., June, 1910).

A question of considerable importance is the interconnections of stations so that the temporary shutdown of one will not throw out of service all the sections fed from that station. One method of accomplishing this would be to install in every station sufficient copper leading from the adjacent stations to enable the full current capacity of the disabled station to be fed into it from the others. The presence of such trunk tie lines would be highly desirable during an emergency, but would be of no service at other times, except as equalizers between the stations. The investment for such ties would be quite large. Essentially the same results have been secured in Chicago by selecting a number of the more important trolley sections and feeding them from two stations.

The entire trolley network is sectionalized with insulators between the sections. All of the trolley sections on the more important traffic lines are fed from two or more substations. These "tie lines" are so proportioned that on the whole system, in case of a shutdown of some of the stations, those remaining in service could carry the load through the tie lines. In all cases these tie lines are uniform size cables running through from one station to another, with the load for the trolley section tapped off somewhere between. The amount of emergency current drawn over the tie lines is regulated by the resistance of the cables and by voltage control at the stations—a lowering of voltage at a station throwing more load on adjacent stations. This tie-line feeder system represents in a measure a factor of safety necessary for successful operation. The number of tie lines varies with the importance of the stations and the density of traffic on the individual section fed from them.

Fig. 5 shows the direct-current tie lines between stations furnishing energy to the surface railways in Chicago. Similar ties exist on the elevated system between their stations. The diagram indicates the various classes of substations, as to ownership, and distribution of current to surface and elevated lines. It will be noted that some ties exist between steam stations and railway substations. These ties are not normally in service but are available for use when it is necessary to run the steam stations, as in severe winter peaks. Then the tied-in substation may be relieved of this portion of its load, which will be available for other sections. This plan of providing a flexible and partially duplicate system of feeders has worked well in practice. The feeder system has been so reliable that service interruptions due to lack of power are virtually unknown. This system of the feeders forms the complement of the alternating-current tie lines already discussed.

It is too often the case among electric railways that the return circuit, except possibly for rail bonding, is neglected, while the positive system is carefully planned and constructed. A poorly built negative system does not jeopardize life or cause delays to the same extent as similar neglect in the positive system, but elements of danger and loss are present which are of great importance. With these thoughts in mind the Board of Supervising Engineers determined to make the return circuit of the best type possible, by the following means:

1. Utilizing the full conductivity of the rails, and making the rail joints equivalent in conductivity to that of the rail.
2. Providing for full conductivity through the special trackwork.
3. Providing additional return conductivity so as to keep the potential gradient on the track to a fair value, and the maximum drop within the limit set by ordinance. (This also limited the current density in the return circuit.)

The first was accomplished by electrically welding the rail joints, which produced a conductivity through the joints somewhat in excess of an unjointed length of track. Cross-bonds were provided every 330 ft. between all four rails, so that a break in a rail did not materially affect the total conductivity. Each rail of 129 lb. had a conductivity equivalent to 1,500,000 circ.mil of copper. Full conductivity through the special trackwork was secured by installing long bonding cables completely around the special work, with the ends of these cables electrically welded to the straight track on each side of the special work. Each internal joint was bonded with No. 00 pin terminal bonds, and the conductivity of heavy twelve-bolt joint plates was also utilized. An entire piece of track special work may be removed without materially reducing track conductivity.

In addition to the four electrically welded rails, auxiliary copper cables are used on every street. In the majority of streets one 1,000,000-circ.-mil cable is buried between the tracks, and each cross-bond is connected to this cable. This auxiliary cable continues through the track special work and is tied solidly to the special bonding cables referred to above. On some of the less important streets a 500,000-circ.mil cable only is used. Near substations the amount of copper is increased, so as to keep the current density in the return circuit within a maximum value allowed. This has the effect of limiting the potential gradient in the return circuit and so reducing the tendency to produce stray currents. The amount of copper thus used in the return circuit is equivalent to approximately 875,000 circ.mil for each double track.

Before deciding on the types of return circuit construction many tests were made covering various phases of the circuit, such as types of bonds, rail joints and cable terminals. In computing the requirements of the return circuit a map was prepared showing the network of tracks and the distribution of cars. From this a diagram was prepared showing the load in amperes for each side of any mesh in the network. The current must of course return to the station from which the corresponding positive feeders are run. A preliminary estimate was made of the probable amount of copper required on each street in addition to the rails, the resistance of each mesh of the network was determined, and the distribution of the current returning to each station was calculated by the laws of divided circuits. The drop in each section was computed and the resultant drop around each mesh was determined. Between two corners of a mesh the drop must be the same by all paths, and if this was not found to be so the current was redistributed. This process indicated in many locations that the current was not properly distributed. At these localities a recalculation was necessary. In this way the copper distribution for the entire return system was calculated. In these calculations average conditions with respect to the return of current to the negative buses at maximum load were approximated as nearly as possible. But on account of changes in distribution with each extensive rerouting or change in stations, it has been necessary to make studies of various localities from time to time.

TABLE III—INVESTMENT IN POWER PROPERTIES FOR RAILWAY USE

	Generating	Substations	Distribution	Total
Commonwealth Edison Company............	$19,800,000	1,125,000	18,000,000	38,925,000
Chicago Surface Lines......................	....	4,750,000	13,500,000	18,250,000
Elevated Lines..............................	4,500,000	425,000	3,625,000	8,550,000
	$24,300,000	6,300,000	35,125,000	65,725,000

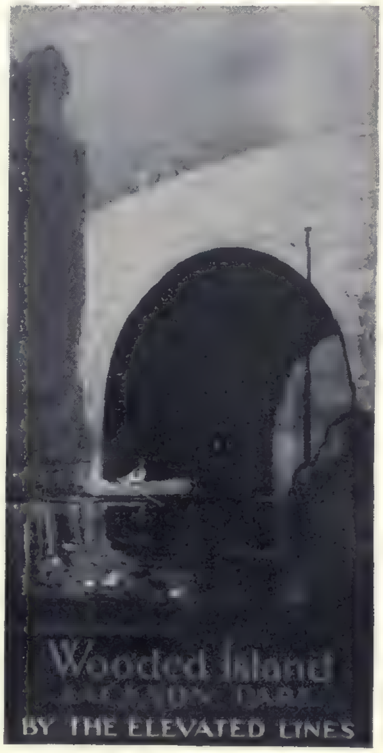
The investment of the surface lines in the positive and negative feeder system is about $13,500,000, including duct and pole lines, all cable and trolley wires and all equipment necessary, outside of the substations.

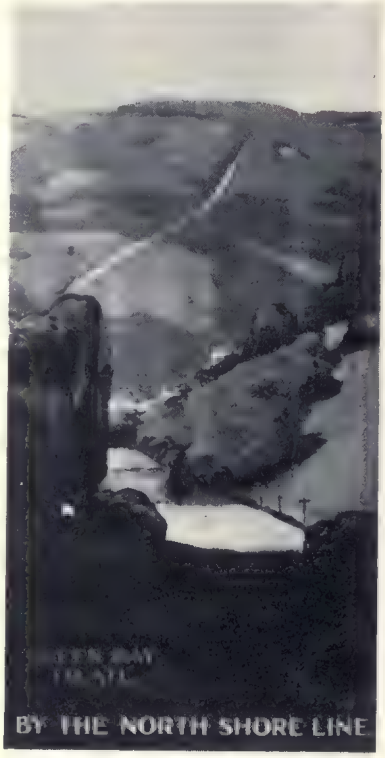
The investment in railway power properties now in service may be summarized in table III.

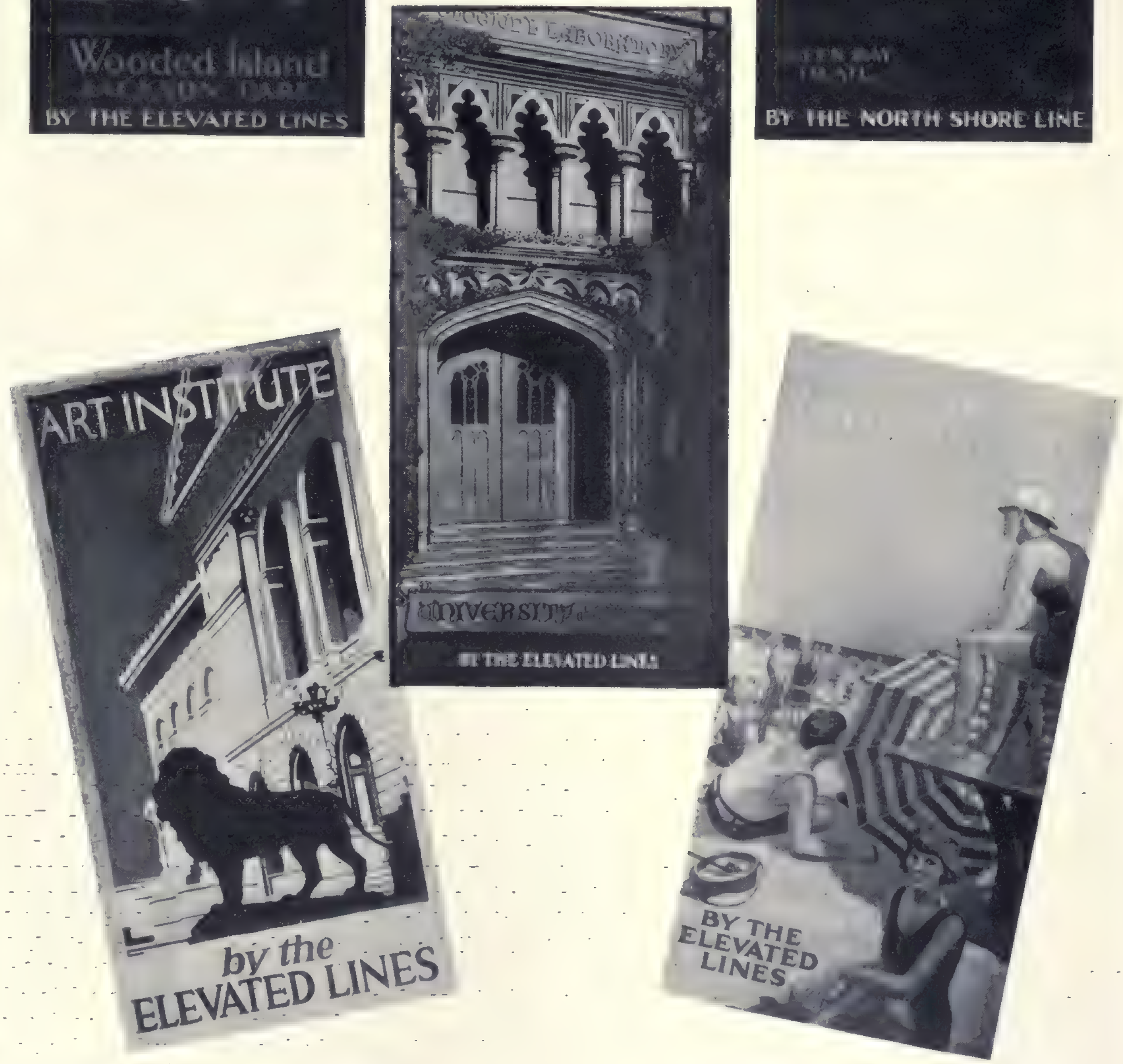
The allocation of the Commonwealth Edison Company investment in property for railway use was made upon the basis of the energy furnished as compared to the total, and upon the equipment required. While it is an estimated portion of the total it probably represents a fair value of investment involved for railway use. The investment values given are for equipment now in service.

Chicago Elevated Vies with London Underground in Beauty of Traction Posters

MUCH favorable comment has been evoked by the artistic posters now appearing on the stations of the Chicago elevated roads. A well organized campaign has been laid out so that the copy of the posters is varied according to the seasonal activities of the people. The reproductions here are typical of the subject matter utilized. The fact that these posters stand out so markedly from the usual type of advertising which appears on the stations has been an important factor in the attention attracted. They are printed in three colors and measure 39 in. x 77 in.




BY THE NORTH SHORE LINE



Typical North Shore Limited train photographed while traveling 65 m.p.h. over rock-ballasted trackway

$1.00 Revenue for $1.47 Investment

By C. E. THOMPSON
Assistant to the President
Chicago, North Shore & Milwaukee Railroad

How the Chicago, North Shore & Milwaukee Railroad Has Been Built Up—Gross Revenue Has Been Increased 350 per Cent in Six Years by a Splendid Improvement of the Physical Property and an Intense Application of Selling—Total Investment Has Been Decreased from $11.80 to $3.76 per Dollar of Annual Gross Revenue

THE Chicago, North Shore & Milwaukee Railroad, now commonly called the "North Shore Line" or the "Road of Service," was organized six years ago (1916) to take over the properties of the Chicago & Milwaukee Electric Railroad Company of Illinois and the Chicago & Milwaukee Electric Railroad Company of Wisconsin. The properties had been operated by federal receivers for eight and one-half years or since January, 1908.

An appraisal of the property at the date of reorganization showed an investment of $12,252,000. The property needed many improvements; improvements in roadbed and track, overhead and transmission lines, rolling stock and power equipment, and improvements in shops and terminals. Most of all it needed improvement in traffic and revenue which would make possible the financing of the improvements in physical property which were necessary to the improvement of the service.

The reorganization plan provided for practically no working capital; business generally was staggering from the early effects of the World War, and the condition of the electric railway industry of the country was such that to obtain new money from the sale of electric railway securities presented a problem of serious undertaking.

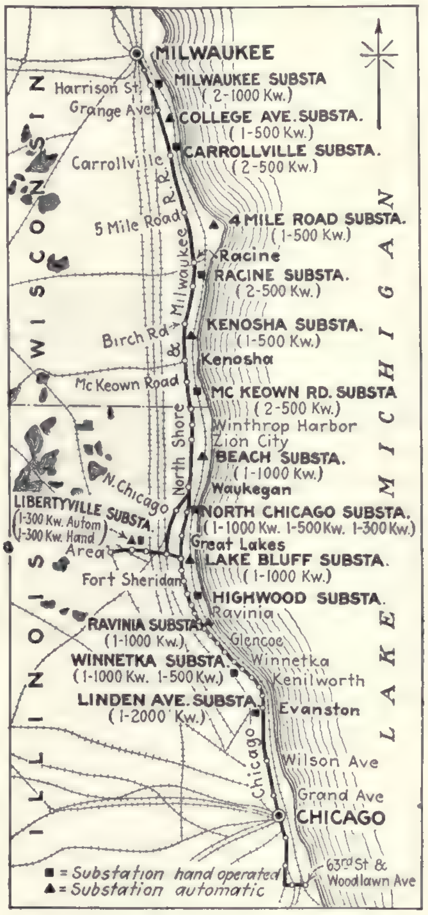
The situation was one that called for an executive with unusual vision and courage and the organizing ability which gets things done. President Britton I. Budd saw at once that with terminals in Chicago and Milwaukee, having a combined population of 3,000,000, the rapidly growing North Shore suburban district between Evanston and Lake Forest, and the growing manufacturing cities of Waukegan, Kenosha and Racine, having a combined population of 200,000, the development of a high-class, high-speed electric railway service would create traffic and justify the necessary investment. While the problem is still in the process of solving, the result at the end of six years is *one dollar per annum increase in gross revenue for each dollar and forty-seven cents increase of investment.* At the date of reorganization the investment for each dollar of annual gross revenue was $11.80. The investment is now $3.76 for each dollar of annual gross revenue. The total investment is now $17,616,000. The gross operating revenue for the year ended June 30, 1916, was $1,038,183; for the year ended June 30, 1922, $4,674,171, an increase of 350 per cent in six years.

Many forecasts were made by financial, engineering and operating experts as to the probable results which could be obtained in the way of increased revenue and traffic, but the actual results have far exceeded what was once considered the wildest flight of engineering imagination. The methods used in building up this property will be treated under two broad headings: First, giving service; and second, selling service.

GIVING SERVICE

As previously stated, many improvements to the physical property were necessary before the character of the service and the reliability of the service could be placed on a real service basis. The additions to the rolling stock and the improved shop practices; the additions to and changes in maintenance standards of the roadway, tracks and buildings; and the additional power and transmission equipment and methods employed in maintaining the overhead trolley system are each treated in other articles in this issue of *Electric Railway Journal*, and will be referred to in this article only to show their effect upon the giving and the selling of service.

The financing of improvements to the amount of five and a half million dollars during this period was no small task in itself. The demand for money to finance the manufacturing and other industries directly engaged in producing equipment and munitions for the prosecution of the World War, the rapidly advancing cost of rendering service, the slow and dilatory action of governmental authorities in granting increases in rates of fare, forced many electric railways into bankruptcy and ruined the credit of the industry. And the rates, when money was obtainable, were so high as to be almost prohibitive. For these reasons the money obtained for improvements during this period was from the sale of equipment certificates, from short-term notes secured by first mortgage bonds and from operating revenue. Of the total new investment made, less than 50 per cent is now represented by outstanding securities.

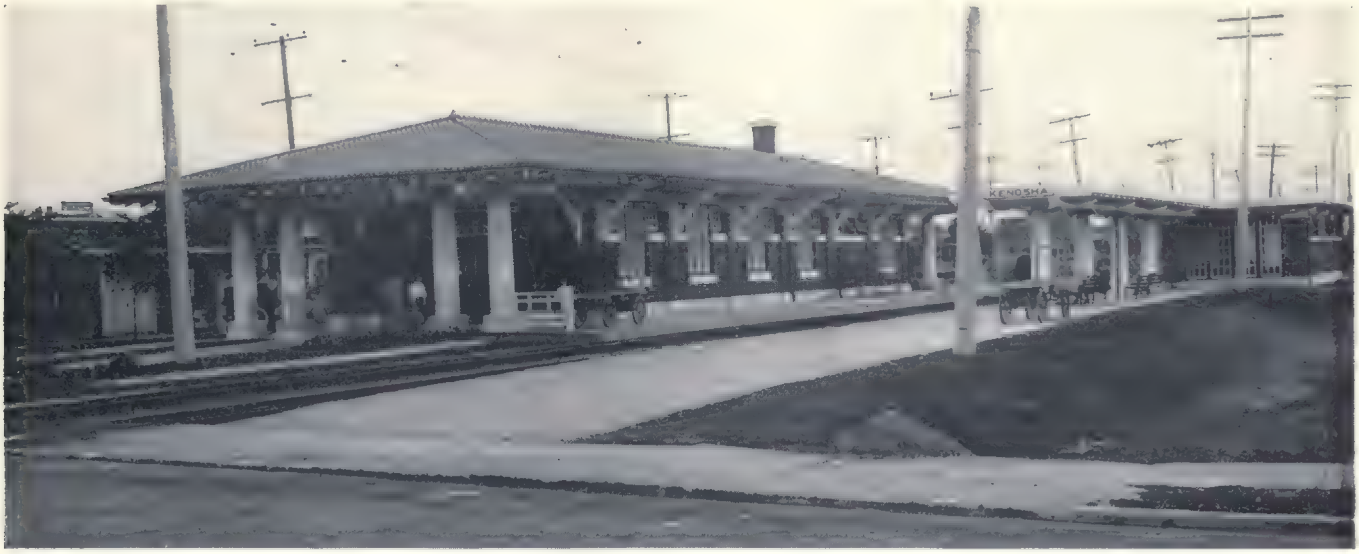


The North Shore Line

The most important part of a railroad is its terminals. When the North Shore line took over the properties, the southerly terminal was at Evanston, where passengers were transferred to the Chicago Elevated Railroads. The Milwaukee terminal was in Second Street, a busy business thoroughfare, with a waiting room in a dilapidated store building. One of the first steps of the new management was to acquire property a block long and half a block wide for a terminal site. A beautiful modern station building was constructed with train sheds and tracks for convenient and efficient handling of the traffic. This station was opened to the public with appropriate ceremonies on Sept. 14, 1920. At the time, the site selected was thought by many to be too far from the business center of Milwaukee. The growth to the west has been so rapid that our terminal is now very near the business center of the city. We have recently acquired practically all of the east half of the block bounded by Sycamore, Clybourn, Fifth and Sixth Streets to provide for future developments of our passenger and merchandise dispatch business.

The Chicago terminal presented an entirely different problem. The purchase of a terminal was entirely out of the question. Negotiations by the receiver for the lease of terminal facilities had been pending for some time, but the obstacles seemed to be insurmountable. The matter was again taken up promptly after the reorganization, and finally resulted in the leasing of all the property of the Chicago, Milwaukee and St. Paul Railway lying between Wilmette and Montrose Boulevard, Chicago. Coincident therewith an operating agreement was made with the Chicago Elevated Railroads for the joint use of the St. Paul property and for North Shore trackage rights over the elevated lines to and around the Union Loop and as far south as Twelfth Street on the south side. Operation under this agreement was

Multiple-unit equipped cars used in merchandise dispatch service



Artistic new station recently opened in Kenosha, Wis.

The Chicago, North Shore & Milwaukee R.R., in keeping with its policy of improving all facilities for the convenience of passengers, on Aug. 12 opened to the public a new station in Kenosha, Wis. With the exception of the Milwaukee terminal, the new Kenosha station is the most imposing on the road and in fact is claimed to be one of the show places of that city. Special attention was devoted in designing it both to obtain maximum utility for railroad purposes and produce a building that would harmonize with the site. The main building is 131 ft. long and 34 ft. wide. Across the tracks on the west side of the line is a platform and a waiting room 48 ft. x 18 ft. The platform will accommodate a five-car train. The building cost was $75,000.

begun on Aug. 1, 1919; and the rights were subsequently enlarged to provide for North Shore operation to Sixty-third and Dorchester Avenue in the Woodlawn district of Chicago. This terminal enables us to deliver passengers, at their pleasure, directly to the Loop, the business heart of this great city, or to the uptown business center at Wilson Avenue, or to the largest south side business center at Woodlawn.

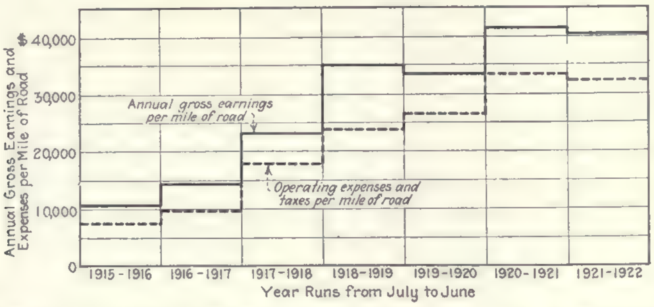
The passenger service, from which 86 per cent of the revenue is derived, has been gradually improved and rearranged to meet the needs of our patrons until there are now five distinct classes of passenger service—city street car service which is operated in Waukegan, Ill., and Milwaukee, Wis.; local interurban service between Evanston and Waukegan at half-hourly intervals, between North Chicago and Milwaukee at two-hourly intervals and between Lake Bluff and Area at half-hourly intervals; express interurban service between Chicago (Loop) and Waukegan at half-hourly intervals; limited interurban service between Chicago (south side) and Milwaukee at hourly intervals daily and half-hourly intervals on Saturdays, Sundays and holidays; De Luxe trains (of which there are six daily) between Chicago and Milwaukee, making stops only at Evanston, Kenosha and Racine. These trains, called the "Badger," "Interstate" and "Eastern," which were recently added to the schedules, make the 86.5 miles in two hours and ten minutes and have proved very popular. They carry dining cars or parlor-buffet cars, are usually three to five car trains, and at least once each week the "Badger" is run in two sections of four cars each. We have found that high speed and reliable service with few stops are appreciated by our patrons.

DINING CAR SERVICE IS VERY POPULAR

One of our most popular features is the dining car service. Special table d'hôte and à la carte service is now provided on seven trains daily. Everything served on these dining cars from the soup, via the North Shore special steak, to the toothpicks and after dinner mints is the best that money can buy and it is prepared by experienced chefs who know how. Reasonable prices add to the enjoyment of the meals. The most recent addition to the service is the "Eastern Limited," which makes connection in Chicago with the "Broadway Limited" and the "Twentieth Century" for New York and other Eastern points. These trains have parlor cars as well as coaches, and parlor-observation cars will soon add attraction to these already popular trains.

Another feature which is operated for the convenience of our patrons are the concessions and restaurants in our stations. Realizing that the traveling public usually avoids railroad concessions and restaurants for fear of inferior goods and exorbitant prices, and knowing from experience the difficulty of controlling the prices and service when the concessions are operated by outside parties, we have undertaken to operate these as part of North Shore service. A high standard of quality and service is maintained. Where practical, local and nationally advertised brands are

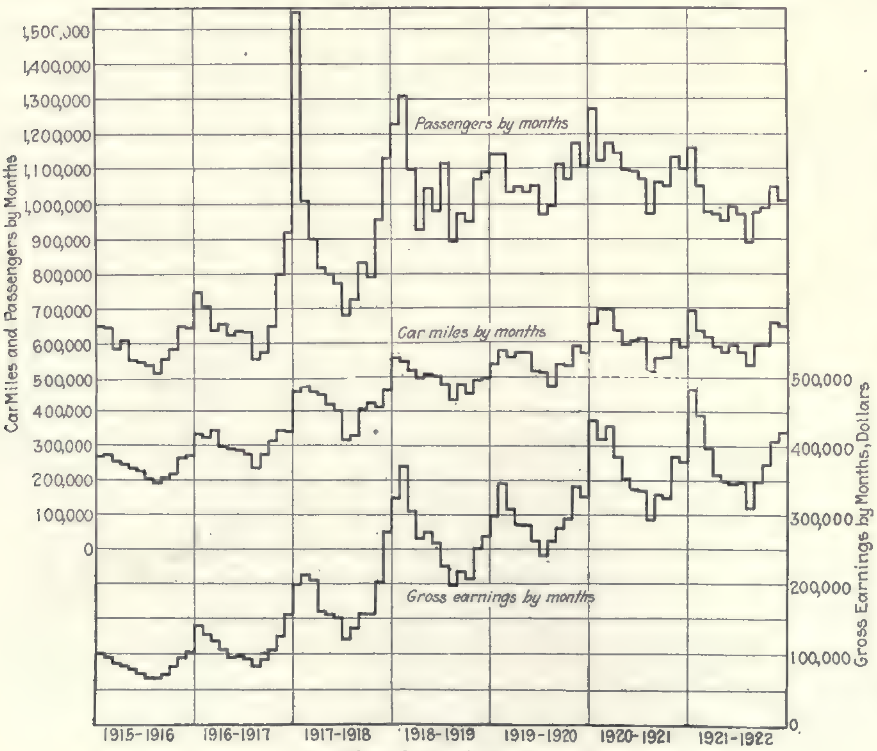
Better view of waiting shelter opposite main station, Kenosha sold at the prevailing local prices. In our Milwaukee terminal station the restaurant is of the most modern design, fully equipped for both table and lunch counter service. A plate lunch is served at 35 cents and a full course dinner at 50 cents. This service attracts not only those traveling via our road, but also draws largely from Milwaukeeans. These concessions now operated in seventeen of our stations produce gross revenue in excess of $300,000 per annum and in addition to the convenience to our patrons, they add a neat sum to our net revenue.



Trend of revenue resulting from improvements and salesmanship

Our city street car service in Waukegan and Milwaukee was as unprofitable as most lines of like character. In 1919 one-man safety cars were purchased for the Waukegan city line and placed in operation early in 1920. Before the cars were placed in service, the idea was sold to the city officials, to the public and to the men who were to operate the cars. Street car fares were being increased wherever possible in an attempt to cover the rapidly increasing cost of operation. We explained our situation frankly and expressed the hope that the one-man safety cars would enable us to give better service and at the same time keep the fare down to a reasonable basis. The trainmen were thoroughly instructed in the handling of this type of car. By the use of these cars the service was increased 90 per cent, the fare was kept down to 6 cents, the traffic was increased substantially and the financial improvement has been quite gratifying. The Wisconsin Railroad Commission has approved of similar operation on our city line in Milwaukee. The cars are being built and will soon be in service.

The passenger service on our branch line between Lake Bluff and Area has never been profitable. We are now having built for use on this line some light-weight interurban cars, designed for operation by either one or two men. The reduction in operating expenses which will become possible by the use of this car will, we believe, make this branch at least self-supporting.



Seasonal variation of traffic, service and earnings, North Shore Line

In 1916 the Adams Express Company was operating on our line and we also did a small amount of carload freight business. The express contract was unprofitable, and the possibilities of carload freight were limited to a small part of the line and consisted largely of sand, gravel and crushed stone, which moved only during the summer months when road building and other construction work was being done. The express company discontinued its service in 1917 and we inaugurated a merchandise dispatch service. This business is handled in express cars constructed for the purpose and the service corresponds with express service without the pick-up and delivery features, although the rates are on a par with the steam road freight rates and the steamboat rates. From a very small beginning this department has developed rapidly until the revenue from this source is more than half a million dollars per annum.

FACILITIES PROVIDED FOR MERCHANDISE DISPATCH SERVICE

Twenty cars are used exclusively in this service and fifteen additional cars are now being built. Four receiving and delivering stations are provided in Chicago at convenient points. The principal station is at Franklin and Austin Streets near the Loop. On the south side is one on Sixty-third Street near Calumet and one at Forty-first and Union in the Stock Yards district. The north side station is on Montrose Boulevard near Broadway. Cars are operated to the Montrose station and to the Sixty-third Street station. Between Montrose and Franklin stations and between Sixty-third Street and Union Avenue station transfer is made by motor trucks. The North Shore Line owns and operates six 5-ton tractors and fifteen 10-ton trailers for use in making this transfer. Two stations are operated in Milwaukee, the principal one, which is 400 ft. long with track capacity of ten cars, is located on our main terminal property at Sixth and Clybourn Streets. The other is at Harrison Street near the south city limits. Ample station facilities are also provided at Racine, Kenosha, Waukegan, North Chicago and other points. In addition to local shipments on our line, business is interchanged with other rail carriers and with boat lines in both Chicago and Milwaukee.

Lying west of the North Shore Line in northern Illinois and southern Wisconsin, there is a chain of very beautiful lakes. This territory provides vacation and recreation places for many thousands of Chicago and Milwaukee families. Many have their summer homes on these lakes and many tourists are attracted by the fine fishing in spring and summer and the hunting in fall and winter. The North Shore Line plans to make this beautiful playground much more accessible and bring it much nearer to the cities by extending its service into this region. A start was made this season by providing motor bus service between Kenosha and Lake Geneva, Wis. This service was popular from the start, and before another summer we will establish other lines until the entire territory is adequately served.

SELLING SERVICE

Does the live merchant, having selected a good location, installed modern equipment and tastily arranged his high-class merchandise, sit down with folded hands and wait for customers to come to him? Or does the successful manufacturer fill his warehouses with his product and then wait for customers to come to him? No! These men advertise. They send out their salesmen and their sales engineers, who give reasons why they should receive patronage; who explain the superior value of their product or merchandise, their process of manufacture, the responsibility of the men behind their business, their ability to make prompt deliveries; they get in personal contact with their customers and create friendships; they use modern selling methods.

Modern selling methods are as necessary in the transportation business as in the sale of haberdashery, boots and shoes, or farm implements. To build a railroad, equip it with fine cars, provide stations and good service and then sit down and wait for customers will naturally get the same results as the retail merchant or manufacturer gets who uses this same out-of-date method—a bare existence or mediocre living.

Our selling methods will be treated under three divisions, i.e., advertising, sales force and public relations.

We have used various forms of advertising. The most effective medium is by word of mouth from patrons who have been pleased by the service. You know it means something, when traveling men are sitting around the hotel lobby, to have Bill say to John, "Have you used the North Shore Line? That's the best service I know of"—and go into details to support his statement. Our patrons are our best advertising medium. And then we use the newspapers, not only the large dailies in Chicago and Milwaukee, but also the dailies and the weeklies in the smaller cities and towns through which we operate. We use the large outdoor advertising boards in carefully selected locations, most of which are illuminated, and also posters at our own stations and on the Chicago Elevated platforms. We use the street car and elevated car cards and many thousands of folders and time cards annually. We have used stereopticon slides in the motion picture theaters with good results and we have two excellent motion picture films which we use in the theaters and at public gatherings of every kind. These are called the "Green Bay Trail" and the "Pace of Progress," each in its interesting way showing the development of transportation from the Pioneers and the Indians to the highly developed electrically operated service of the North Shore Line. These films will be exhibited at the convention at the North Shore exhibit space.

We also have the "North Shore Bulletin," which is issued monthly and distributed to a large mailing list and also direct to our patrons on the cars. This unique "house organ" is stamped by the individuality of its Scotch editor, and while it bristles dry humor, it also carries a message each month with his philosophy and about some improvement or new service which the road is providing.

Another form of advertising which we have used freely is *paint.* No, I don't mean the paint used on the billboards and posters. I mean the paint used on the cars and the stations, and on the signs and signals along the right-of-way. No money is spent in the maintenance of a railroad to better advantage than that spent for paint. You not only preserve the steel and the wood which is covered, but you show the public that you are up and doing. In addition to the paint we have used shrubs and flowers and grass, and the lawnmower, to improve the appearance of our station grounds.

Main waiting room in new Kenosha station

As I have said before, the most effective advertising medium is by word of mouth. While we have been improving the roadway, adding new equipment, building new stations and improving the service, yes, and raising the rates, we have told our patrons our plans and called their attention to the improvements and explained the reasons for increasing the rates; all the time giving them something to think about and to talk about and letting them know we have transportation for sale.

We believe that advertising pays. And while it is very difficult to measure results directly, we think all the forms of advertising used have produced. But we haven't depended entirely on paint and printers' ink. We have our salesmen on the road calling upon our trade. Our traffic men find shippers who don't know about our merchandise dispatch service. They find booking agents who didn't know the North Shore could handle the properties of a troupe having an elephant and several ponies. They call at stage entrances on actresses who didn't know they could, by using the North Shore service to Chicago, leave Milwaukee after their evening performance and be in St. Louis for rehearsal the following morning. They find many lodges which are pleased to learn that the North Shore has all ready for their use their illuminated emblem to be placed on the front end of their special train. Our traffic men not only find new customers but they keep in touch, both by personal calls and by mail, with those who already know of and are using our service.

Our sales force is not confined to our traffic department, however. All of our employees are salesmen, and especially those who come directly in contact with our patrons, such as our station agents and our conductors. By intelligent selection, careful instruction and close supervision we now have courteous, obliging, well-informed "business-getters" on our trains and in our stations. Supplementing the usual rule books, bulletins and other written instructions, we have frequent meetings with our agents and also with our trainmen at which our plans for new lines of service are discussed, questions are asked and answered and the part our agents and trainmen have in developing and keeping business is emphasized. Our patrons are impressed with the uniform courtesy of our employees, and both the employees and the management are proud of our reputation in this respect.

PUBLIC RELATIONS AND EMPLOYEE RELATIONS

The progress which has been made in the development of this property can be attributed in large measure to a very definite policy of fair and liberal treatment of our employees and the public. The road has paid the highest wages conditions would warrant and provided the best working conditions. At the Highwood headquarters a restaurant is provided which serves wholesome, well-cooked food at cost, and a liberal discount is allowed employees at all restaurants and concessions operated by the company. Recreation rooms are provided at Highwood and at the Milwaukee Terminal. A visiting nurse is provided by the company to assist any who are sick or have sickness in their family. A mutual benefit association, to which all employees are eligible to membership, is supported on the basis of the company paying into the fund 50 per cent of the amount contributed by the members. This association pays both sick and death benefits and has proved very helpful. Americanization work among our foreign speaking employees is directed by an expert in this line, assisted by volunteer services from our supervisory force. This work includes teaching of English, instruction in American ideals and standards, sanitation and recreation; our objective being the naturalization of these men until our employees are 100 per cent American citizens.

Organized safety work under the direction of the bureau of safety has had a prominent part in the improvement of the service. This work is so organized that the interest of every employee is enlisted, every suggested improvement in operating practice and in the physical conditions are carefully considered and promptly acted upon. Our standard is service with safety. In addition to its work among our employees, this organization has preached the gospel of safety to all school children and to many clubs and societies in our territory.

All legitimate claims, whether for personal injury, loss or damage, overcharge, or for ticket refunds, are settled promptly and whenever possible on the day received.

During the six years we have obtained new franchises in Waukegan, Lake Forest and Highland Park. Each case involved the acquisition from the city of all or parts of the public streets, for private right-of-way and for extensive improvements in the way of track extensions and the relocation of highways. Negotiations were on a business basis, the public was fully informed as to what the railroad was to get and what it was to give the city in addition to the better service which the improvements would make possible. In two of these cities having commission form of government, the franchises were approved by popular vote.

The passenger fares six years ago were very low, the average being less than 1¼ cents per mile. Rapidly rising costs due to the World War made increases imperative. This involved not only increasing the mileage rates but also the setting aside of commutation rates provided by municipal franchises. Our first step was to increase the rates to 2 cents per mile and eliminate the low commutation fares. Through extended hearings before the state commissions our cards were all on the table face up, the public was fully advised as to both the legal and economic phases of the situation, and the first bridge was crossed in 1917 with little, if any, ill-feeling. Later in 1918 our interstate and Wisconsin intrastate rate was increased to 2½ cents per mile; in September, 1920, to 2.7 cents per mile, and finally in November, 1920, to 3 cents per mile, the rate for Illinois intrastate traffic remaining at 2 cents per mile on account of statutory limitations until July, 1921, when these rates were raised by order of the Interstate Commerce Commission to the same basis as the interstate rates to remove the discrimination against interstate traffic. When our service was extended into Chicago, commutation rates were voluntarily established between Chicago and the Illinois suburban towns on the basis of 1.6 cents per mile for the twenty-five ride ticket and 1.84 cents for the ten-ride ticket. These rates, which are still in effect, average 28 per cent higher than corresponding rates on the steam road between the same stations. All other passenger rates are uniform for the entire line and are now:

Interurban:	
Cash fare	3.3 cents per mile
Ticket fare	3.0 cents per mile
25-ride ticket	2.5 cents per mile
1,000-mile book	2.5 cents per mile
60-ride monthly	1.5 cents per mile
50-ride child's	1.0 cent per mile
City Lines:	
Waukegan	6 cents
Milwaukee	6 cents

Modern business success is accomplished through organization. In addition to the many other problems involved in the rapid development of this property, there was the problem of developing an organization. This was largely accomplished by selecting men from the ranks and training them for superintendencies and other supervisory positions. Through frequent meetings of the executives and supervisory force, the president outlines the policies to be followed. Programs are laid out, all criticisms and suggestions are considered and each department kept closely in touch with all contemplated changes in service and plans for development of the property. All matters of importance are referred to a special committee or to one of the standing committees for careful consideration and for their recommendation. The more important of the standing committees are the rate committee, which considers all contemplated changes in passenger, merchandise dispatch and freight rates; the authority for expenditures committee, which passes upon all expenditures for additions and betterments to the property, and the budget committee. The work of the A.F.E. committee (as the second is called) has been especially important owing to the fact that the small amount of money available each year had to be expended for those improvements which would be the best from the revenue producing standpoint. When money for improvements depends upon each dollar expended producing 70 cents additional revenue annually, great care must be used in deciding which of the many "necessary" improvements to defer.

The work of the budget committee has also been very important. We are using the budget system for the sixth year for both operating and capital expenditures. Prior to the beginning of the year, each department submits in detail and by Interstate Commerce Commission classification of accounts the amount required each month of the ensuing year to operate that department. These estimates are predicated upon an assumed operating schedule prepared by the transportation department and passed upon by the budget committee. Based upon the same estimated car-miles for each class of service, the committee carefully estimates the operating revenue, and a budget of operating revenue and operating expenses is thus prepared. After carefully considering the estimates of capital expenditures required, the committee determines the maximum total amount that can be financed, based upon the budget of operating revenue and expenses. This committee then eliminates those items of capital expenditures which can best be deferred. After determining in what months the new capital will be expended, the interest and other fixed charges are determined and the income budget is completed. The budget of capital expenditures and operating income are then submitted to the president and board of directors for approval. The actual results are then compared with these budgets monthly, and any over-expenditures promptly brought to the attention of the department responsible. The work of this committee is so carefully done that the actual results for the year are frequently within 1 per cent of the budget estimates.

Our auditing department has worked out a very complete cost accounting system under which the revenues and expenses of various classes of the service are segregated and reports rendered monthly so that each department knows what kind of a financial showing is being made. For example, a report is made monthly covering the operation of the merchandise dispatch service, another for carload freight, one for each of the city lines, one for the motor truck service, one for the motor bus service, etc. Monthly meetings are then held which are attended by the superintendents and the accounting officers at which the results are analyzed, attention is called to any unusual charges, and by the use of charts the general trend of each department is illustrated. This cost system has been very helpful to the management in determining what classes of service are most profitable and along what lines it is best to make developments. It has also had an important part in the education and development of superintendents and others who have been promoted to supervisory positions. To obtain real efficiency those directly in charge must know the cost of rendering service and must also realize that the service must always be just in advance of the requirements in order to create traffic.

In addition to developing our own organization, we have used to advantage various experts who render special service in systematizing the work of our own departments. Among these are the Bureau of Railway Time Service, Western Weighing and Inspection Bureau, Western Demurrage Association, Bureau of Commercial Economics and the Bureau of Safety; also experts in filing, forms and correspondence, in valuation work and in accounting.

Special attention has been given to the elimination of claims. When claims do arise they are disposed of promptly, but it is much better business to prevent them. In addition to the direct effect upon traffic, accident prevention work has a direct bearing upon the efficiency of the organization. Safety and efficiency go hand in hand. We have invested approximately $100,000 in crossing gates and automatic signals to protect the general public, besides the many improvements for the protection of our employees and our patrons. We are spending $150,000 per annum in the maintenance and operation of safety devices. Practically all the work of our merchandise claim department is in the elimination of loss and damage claims. Actual payments in settlement of such claims now amount to less than 1 per cent of the gross.

The North Shore management has the same threefold obligation that every public utility has. The first, the obligation to serve the public, we believe we have met by giving this territory a very high grade, high speed, electrically operated railroad service. The second, the obligation to the employees, has also been met by providing good working conditions and by paying the highest wages which can be justified by the general economic conditions and the earning power of the property. The third, the obligation to pay a fair return to those who have invested their money in the property, has not yet been fulfilled. The investor's position, however, has greatly improved since the reorganization, and the indications are that a fair return may soon be earned, not only on the new capital invested, but also upon the fair value of the property.

NUMBER OF TRAINS OPERATED ON CHICAGO, NORTH SHORE AND MILWAUKEE RAILROAD

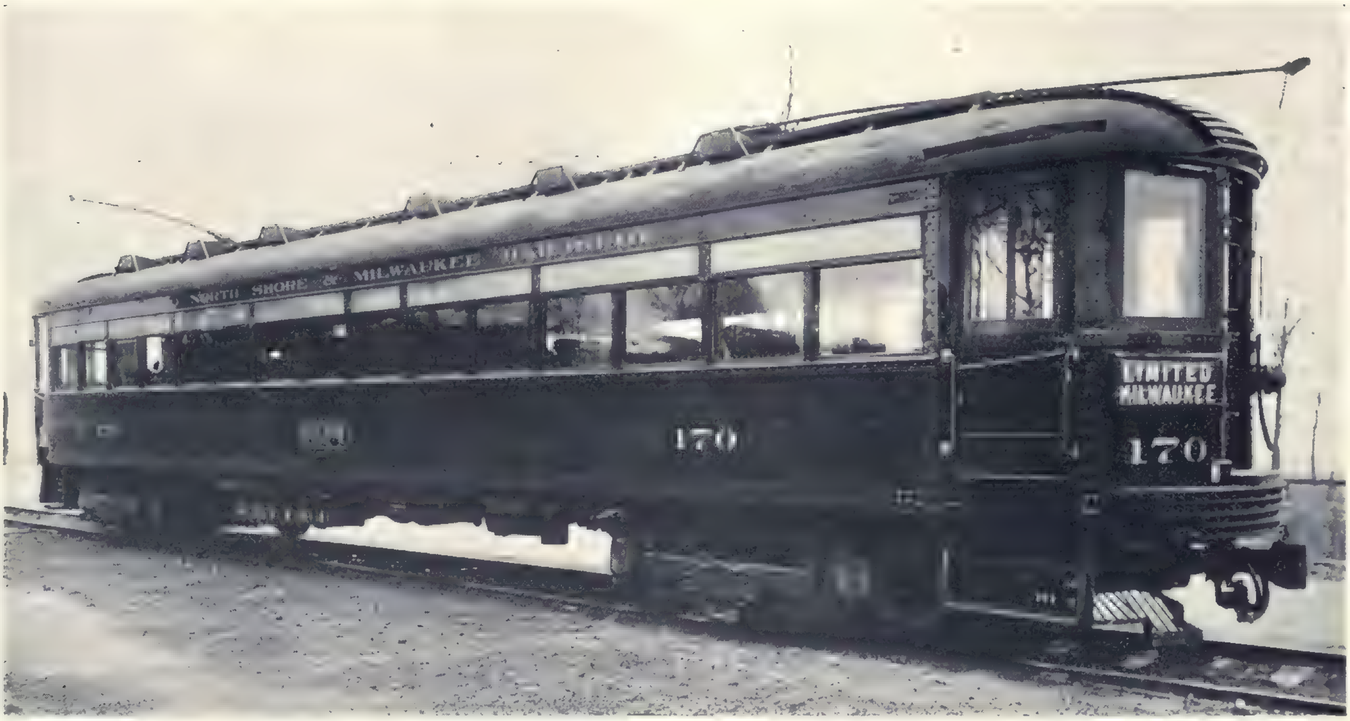
	July, 1916		July, 1922	
	Daily	Sundays Holidays	Daily	Sundays Holidays
Local Trains				
Evanston-Waukegan	103	116	71	64
North Chicago-Milwaukee	23	21	36	27
Lake Bluff-Area.........	36	40	68	68
Express Trains				
Chicago-Waukegan	..	..	59	69
Evanston-Waukegan	..	..	15	4
Limited Trains				
Chicago-Milwaukee	..	..	46	59
Evanston-Milwaukee	30	33	..	..
	192	210	295	291

Much has been accomplished, but those responsible for the success of the road feel that only the foundation has been laid; that upon that foundation may be built a transportation service meeting every need of the communities served, furnishing employment to many people at fair wages under favorable conditions, and earning a fair return for all those who may become financially interested in the Road of Service.

Comfort, speed, quick acceleration, operation in trains and on elevated structures, through slow suburban territory and fast open country are among the

Requirements Imposed in Designing North Shore Passenger Cars

By H. A. OTIS
Engineer of Equipment
Chicago, North Shore & Milwaukee Railroad



Type of steel passenger car which has proved very successful on North Shore Line

MANY limitations and special requirements were imposed upon the engineers in developing the design of passenger equipment for use on the Chicago, North Shore & Milwaukee Railroad. Part of these restrictions and requirements are readily seen from a brief characterization of the route over which the trains operate. Trains start in the Woodlawn section on the south side of Chicago, travel over the elevated railroads through the Loop district, the Wilson Avenue district and the north side of the city, and then through the fine residential suburbs along the North Shore. Operation is entirely over the elevated structures and tracks leased from the Chicago, Milwaukee & St. Paul Railroad to a point approximately 16 miles north of the downtown Loop district, or to the southern edge of the village of Wilmette, where the North Shore tracks begin. From Wilmette to North Chicago Junction there are numerous suburban towns which result in the necessity for a suburban service along this part of the line. From North Chicago to Milwaukee the route passes through open country and strikes the prosperous manufacturing centers of Waukegan, Kenosha and Racine, covering a distance of approximately 50 miles to Milwaukee, the northern terminal. For many miles the North Shore line parallels the tracks of the Wisconsin division of the Chicago & Northwestern Railroad, which operates frequent, fast, first-class trains between Chicago and Milwaukee.

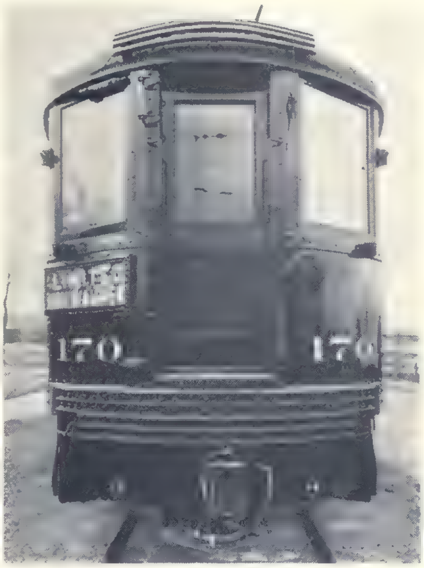
With the conditions of this route in mind, it will be seen that the North Shore cars must meet the limitations in length, width and height imposed by the clearances of station platforms and curves on the elevated structure, which was built many years ago without thought of serving other than local service. For this reason the North Shore cars are narrower and shorter than they otherwise would have been built. The vestibule posts have also had to be set in, in order to assist in gaining the greatest length while still meeting the elevated clearances. It is also necessary that the North Shore cars be limited to a certain weight per axle, and certain spacing of the axles to prevent overloading of the elevated structures. On account of the suburban operation at the south end of the system numerous stops must be made, and this necessitates that the cars be equipped with sufficient motor capacity to permit of rapid acceleration, in order to keep up a high average schedule speed. This matter of high schedule speed for the entire run also necessitates that sufficient motor capacity be provided to operate at fairly high maximum speed through the open stretches of track at the north end of the system.

As the North Shore Line is in direct competition with the very excellent service of the Chicago & Northwestern Railway, the running time on the North Shore must compare favorably with that of the steam railroad time in spite of the suburban service limitations at the south end, in order to obtain its proportion of the business. This means that the cars must attain a speed of 65 m.p.h. Besides speed, the North Shore must compete with the steam railroad in the matter of comfort and convenience to passengers and in safety of operation.

The amount of traffic and the frequency of trains was also another matter which had to be considered in the design of this equipment. At first a considerable number of one-car trains were operated and this make-up was maintained by shortening the time between trains until the point was reached where there were limited trains leaving Chicago and Milwaukee every hour. As the traffic further increased more cars were added to the trains until now there are practically no single-car trains, and many of them run with four and five cars. Operating four and five-car trains at a speed as high as 65 m.p.h. obviously introduces many problems to be taken care of in the way of buffing stresses, and stresses that would develop in the event of collision or derailment, which are not so important in single car operation.

HEAVY STEEL FRAMING PRODUCES SAFE AND QUIET CARS

A great deal of study has been devoted to the development of a proper design of the steel framing on the North Shore cars to prevent telescoping in case of collision and to make these cars as safe as possible in every way for the passengers riding in them. The sub-frame has been developed along the general lines which have proved satisfactory in heavy steam railroad service, having continuous center sills form end to end of the car, which are heavily reinforced at the ends. The vestibule framing has also been very carefully worked out to give as much strength as possible to the vestibules to prevent crushing in. The vestibule corner posts, body corner posts, train door posts and bulkhead arch posts are all tied together at the top by means of steel members and a heavy steel cover plate. The steel cover plate also forms the vestibule ceiling. This steel frame construction has proved very satisfactory, and it is believed that it meets the conditions for which it was designed.

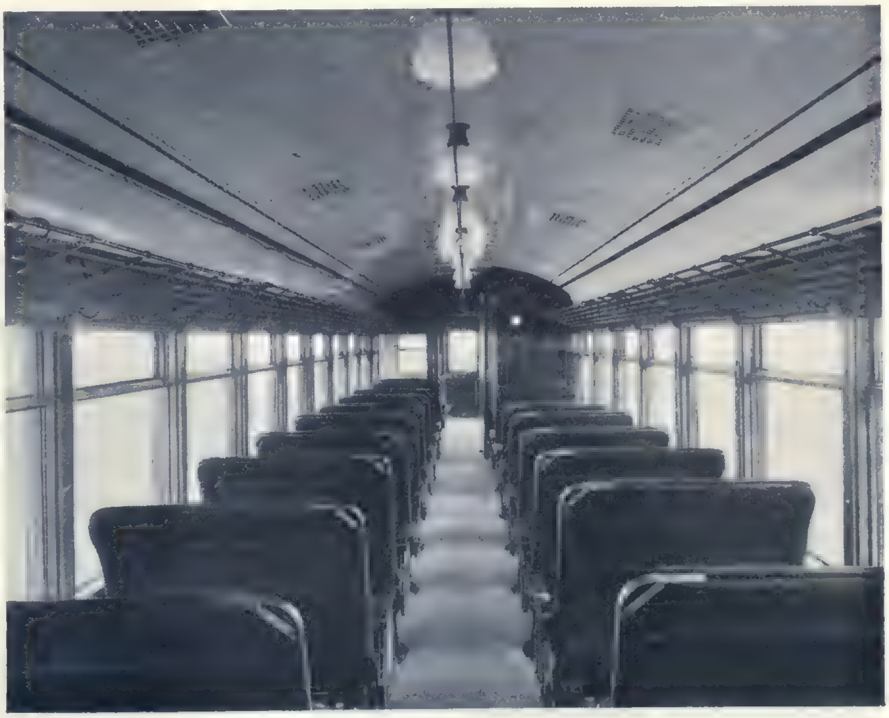


Train door, heavy end construction and equipment

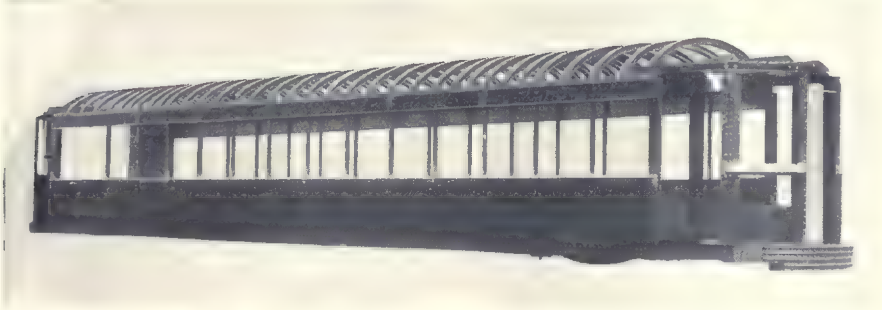
In the selection of air brake and electrical equipment and in the building of the trucks no expense has been spared to obtain the safest and most reliable equipment known to the art. Another important matter on which a great deal of time was spent was the matter of riding qualities. It has often been said that the average interurban railroad cars do not ride as easily as the cars on the steam railroads, and various causes have been assigned for this. The management of the North Shore Line has insisted upon obtaining trucks which would ride as easily as steam railroad equipment. This has been accomplished by paying particular attention to the design of the trucks and springs.

There is a tendency among many spring and truck manufacturers to provide springs which are somewhat too stiff. This is the result of insistence that the spring shall stand up without sagging for a long period of time, and also because there is a tendency for cars to weigh more than is estimated before construction, which causes manufacturers to make rather generous allowance in dimensioning the springs in order to be on the safe side. Also, the live load variation on electric cars is so large in proportion to the weight of the cars light that it is rather difficult to design springs which will provide easy riding when the car is light and still have sufficient capacity for a heavy passenger load.

In order to accomplish the desired end as to riding qualities, the closest co-operation must exist between the railroad company and the spring manufacturer, and both sides must



Interior appearance is pleasing and the ride is quiet and comfortable

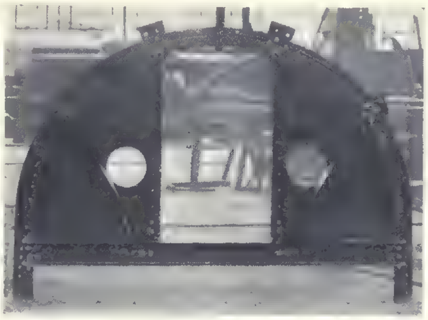


Steel body construction with special steel framing, giving great strength to vestibules

be willing to make concessions and to provide proper data and exact conditions under which the springs will be expected to operate. To provide easy riding they must be flexible. But many equipment men maintain that flexible springs will take a permanent set and will not last as long as stiffer springs. The management of the North Shore, however, has insisted that springs must be provided which will produce a comfortable riding car under all conditions of passenger load. If, in meeting these conditions, it becomes necessary to replace the springs more frequently than has been customary, that is considered merely as one of the expenses incident to the kind of service which is being rendered the public, just the same as any other operating expense.

As a matter of further convenience to the traveling public, the North Shore Line is now operating five dining cars between Chicago and Milwaukee. In addition, among the new cars which are now under construction there are one dining car and two parlor observation cars.

The five dining cars which are at present in service are arranged so that they can be converted into parlor cars by the removal of the tables, which are than stored in a locker provided for that purpose. They are operated as dining cars part of the time and as parlor cars on other trips. The new dining car which is being constructed will be used only as a dining car, so that its equipment will be adapted for dining car purposes only. Similarly the two new observation parlor cars will be designed for use as parlor cars only and no facilities will be provided for the serving of meals or luncheons.



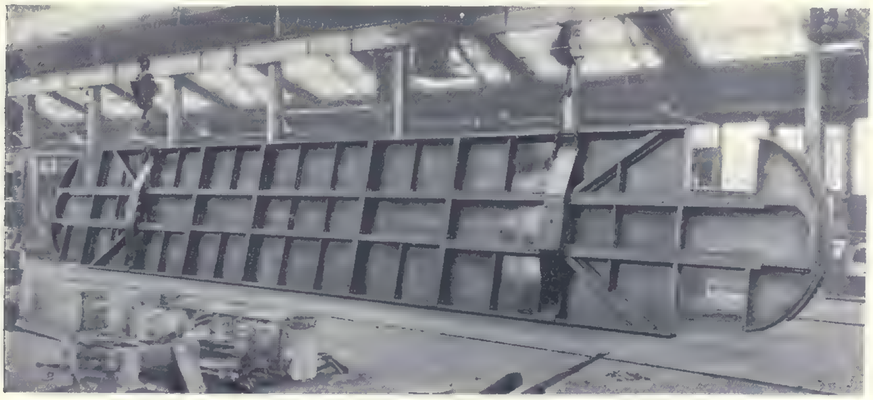
Top plate number of vestibule framing

The interior finish of all the North Shore passenger cars is a plain, simple design, but it is pleasing and the decorating is in good taste. Plush seats of steam railroad design are installed in the main passenger compartment and spaced far enough apart so that passengers are not uncomfortably crowded. The seats in the smoking compartment are upholstered in imitation leather.

The cars are well heated and ventilated and the lighting system provides generous illumination. The cars which are at present in service are equipped with large hot water heaters. While this form of heat is good in cold weather, there are times of mild weather in spring and fall when the cars are overheated, causing some discomfort to passengers. This is due to the fact that trainmen are unable to control the heaters properly. It is expected that this condition will be obviated in the new cars now under construction by the installation of an auxiliary system of electric heaters. The electric heat can be used in mild weather in spring and fall and can be easily controlled to meet the wishes of the passengers. In extremely cold weather the electric heaters can be used to supplement the hot water heaters. This scheme will give a considerable variation in the amount of heat available, and should enable trainmen to maintain a satisfactory temperature.

A feature of the new North Shore coaches will be their equipment with electric fans in addition to a first-class ventilating system.

That the policy of the management to provide fast, safe, reliable and comfortable service has been carried out in the design and construction of these cars is perhaps indicated by the growth of the passenger business handled and by the numerous letters received from patrons commenting upon the comfort of the cars and pleasure of the ride.



Steel underframe of North Shore passenger cars

Supervisory Control on the North Shore Automatic Substations

A SYSTEM of supervisory control is now being installed in two automatic substations of the Chicago, North Shore & Milwaukee Railroad. By this system the load dispatcher in North Chicago can take either or both of these stations off the line or put them back so that they will operate in the normal automatic way. The control, which uses standard equipment, is an adaptation of the Western Electric Company's train-dispatching system. No additional circuits to the substations were strung, but the control is operated through the existing single pair of telephone wires.

It is expected that the supervisory control of these two stations will be installed and in operating condition by the time of the American Electric Railway Association convention. The installation is being made by the General Electric Company, which supplied all the automatic equipment on the North Shore line.

How the Difficulties of

Using Direct Suspension Trolley in High-Speed Train Service

Have Been Worked Out on the Chicago-Milwaukee Railroad—The Bonding Experience and Manner in Which the Power Supply Is Being Improved Are Also Treated

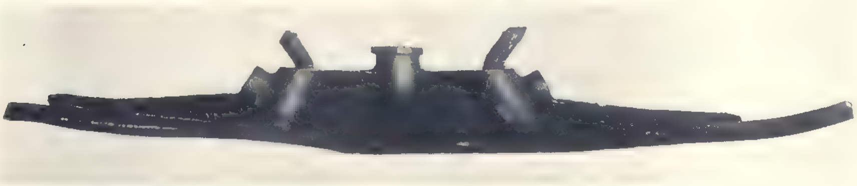
By CLIFFORD HUTTLESTON
Electrical Engineer
Chicago, North Shore & Milwaukee Railroad

Plain span overhead on North Shore Line and, incidentally, a good view of a well-trimmed roadbed

CHANGING from a rather infrequent service employing single 30-ton wooden cars operating at a schedule speed of 15 m.p.h. to a frequent service using from one to six steel 50-ton cars per train operated at an average schedule speed of 47 m.p.h. and a maximum of 70 m.p.h., without any material changes in the overhead construction, is what has actually taken place on the property known as the Chicago, North Shore & Milwaukee Railroad. The overhead construction is what is known as "direct suspension," familiar to all, with double pole line and ⅜-in. messenger crossspans. And today with the increase in weight of cars, more frequent service and longer trains, there are fewer delays, fewer accidents, fewer dewirements and fewer wire breaks than at any time for years past. The reason for this is due primarily to the excellent co-operation existing between the electrical, mechanical and maintenance of way departments, as laxity on the part of any one of these would contribute to poor operation. We are constantly endeavoring to live up to our slogan, "The Road of Service."

The line force of the North Shore Line consists of a foreman, ten linemen and three helpers. The equipment at the disposal of these men consists of two line cars used the year around, and an additional car used several months during the summer or heaviest traffic season. The territory covered by these men extends from Evanston, Ill., to Milwaukee, comprising 70.53 miles of double track, a branch line from Lake Bluff to Area, which has 8.6 miles of single track, and several miles of city trackage in Waukegan and Milwaukee, or a total of about 180 miles of single No. 000 grooved trolley wire, not counting sidings and crossovers. A three-phase transmission line, the d.c. feeders and two telephone lines covering the entire distance and a third telephone line 12 miles in length are also maintained by this line force. In addition to the maintenance of the overhead lines these men do all of the reconstruction and such new construction as is required on a healthy property for the improvement of service and the proper handling of new business.

Because of the difficulty of locating an overhead frog or switch so that several different types of equip-



How splice ears wear away at the ends forming shoulder and causing dewirement

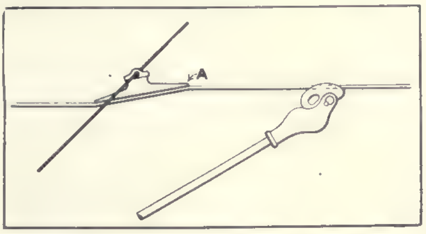


Illustration of why splice ears wear irregularly and cause dewirements

ment will ride through it, and also in order to provide a smoother wire, frogs or switches are not used on the main line at crossovers or sidings. A crossover wire is provided at each track crossover, but the wires that lead to the sidings are extended, paralleling the main line to a point 300 ft. beyond the switch point to give time to change all current collectors on a train from the main-line wire to the crossover or siding wire or vice versa.

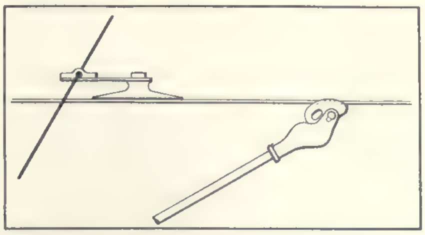
In the latter part of 1915, when the first fifteen high-speed steel cars were put into service, we undertook to operate them with trolley wheels, as the sliding contactor or shoe was to our mind then an untried piece of apparatus. In fact, it came out at about this time. Wheel operation was not at all satisfactory. It was expected that the substantial construction, pleasing appearance and comfortable riding qualities of the new cars, as well as the faster service, would please our old patrons and make new friends. Instead there were numerous dewirements and the cars were filled with a loud rumbling noise, spoiling what would otherwise be an enjoyable ride and creating anything but a favorable impression of the "improved service." It was a serious matter requiring serious consideration, and we could not afford to pass up any suggestion offered for overcoming the difficulty. Much time was spent and study made in a short period of ways and means of eliminating the noise. The retriever question was a live one. Retrieving, however, was not the cure. The sliding contactor or shoe was considered and tried and in a short time all of these cars in limited service were equipped with the Miller shoe.

We believe these sliding contact shoes have been very much improved since that time. No actual measurements of wire are taken, but the condition found on inspection shows conclusively that there is less wear on the trolley wire due to the use of sliding contacts than there is due to wheels.

The sliding contactors put a high gloss or polish on the wire very similar to the polish on a good commutator. No lubrication is used. With the pole in the operating position, 35 lb. was found to be the best trolley pole tension. In fact, to vary much from this invites trouble and causes dewirements. Consequently, the trolley base tension is set and frequently checked with a scale or weight to keep it at this amount.

We found that six conditions, singly or in combinations of two or more, would give trouble (cause dewirements and wire breaks) with high-speed operation on direct suspension, namely:

Poor alignment. This is sometimes caused with certain soil conditions by the temporary removal of the back guys for ditching or other improvements. Alignment is easily maintained but requires watching.



One scheme tried of supporting splice ears

Special Drew ear designed to overcome rapid wear of ordinary splice ear

Slack wire. This depends much upon the temperature, but it nevertheless must not be allowed to become bad as with a high wind it causes dewirements, the rear trolley pole of a train being by far the greatest offender due to the side swing of the wire and the influence of the preceding trolleys on it. And without a high wind, the resulting rapid change in level or height of the shoe above the rail will frequently cause dewirements, or cause the operation of a sensitive retriever. For successful operation slack wire must be cut out, and when cold weather sets in some slack must be put back or breaks under tension will result.

Improper trolley base tension, referred to above.

Stiff trolley base or one not working smoothly because of pitting in raceway or for other reasons. In one instance when we were unable to account for an epidemic of dewirements, a list of the offending cars was obtained and the trouble was detected and cured by replacing the inferior bases.

Rough track. This causes rocking or side sway of the car and it may cause dewirement if there is slack wire or a stiff trolley base. We are rather proud of our present roadbed and track, and extensive improvements are constantly being made which are mitigating this source of trolley trouble.

Wire splices. We are not satisfied with the present-day practice of splicing trolley wires. We have tried different types of splicing ears with their "smooth underrun" but to date have not found one that gives us entirely satisfactory service under high-speed operation with a sliding current collector. We have very few wire breaks, but most of those we do have are caused by the unsatisfactory splices. As the sliding current collector approaches a splice, particularly when located at the span wire, the near end of the splice tends to rise as shown exaggerated in an accompanying sketch. The slider tends to dig in to the splice at point *A* and bounds away, making contact again after passing the splice. In time, a shoulder is formed on the underside and if let go this will cause a dewirement, or the continual pounding will cause the wire to become crystallized and it then eventually breaks just inside the splice, it being impossible to detect crystallization on inspection. We are trying one or two splices installed as shown in another sketch reproduced herewith. We find these give longer service but they are not the solution of the problem. At our request a special splice was designed by the Drew Electric & Manufacturing Company which appears as shown in an accompanying picture. This is a long sherardized malleable casting in which the two ends of the trolley are brought together without bending. While it has given reasonably good service we are not entirely satisfied. We hope, however, that this splice can be improved upon as it provides an absolutely smooth underrun and has none of the objections belonging to the common splicer. We have given it about one year's trial and believe that it is going to enable us to cut down materially on the maintenance of splices. Until it is improved so we can install it generally, we shall have to continue to true up frequently the ordinary splices and renew them before they become bad.

Most of our splices are installed with boss at the cross span. Splices without boss installed away from the cross-span give much smoother operation and longer life if they do not become tipped to one side. If slightly tipped, or if a shoe becomes deeply grooved, as happened occasionally during the earlier days of shoe operation, we again have trouble. Over the entire system we have been averaging about eight years wearing life on the trolley wire and about eighteen months on the splices. This life should be considered in conjunction with the annual car mileage on the system presented in the article by Mr. Thompson, elsewhere in this issue.

For some years on wire renewals we have been recovering 60 per cent of the original weight as scrap, 40 per cent being the usual wear. Considering the scrap value of the trolley wire and the comparatively low labor cost on a renewal job, we favor renewing before 40 per cent weight has been used in wear. Probably from 30 per cent to 35 per cent wear will be found about right in our case, to insure a good factor of safety against breaks.

SOME BONDING EXPERIENCE

The concealed 10-in. No. 0000 compressed terminal rail bond was our standard for some years. Six or eight men installed thirty or thirty-five bonds per day on pick-up work where renewals ran about 6 per cent. The American Steel & Wire Company bond tester was used in locating bad joints. When the resistance of a joint was found to equal that of 6 ft. or more of rail, the joint was marked by the testers as being bad.

As the service increased the question of opening joints under service conditions and the slowing down and stopping of trains became a more and more serious objection. In 1919, during January, No. 0000 L.U. bonds applied with the Rail Welding & Bonding Company machine were adopted as standard. A foreman and three men install from sixty to eighty of these bonds per day on pick-up work. L.U. bonds of 300,000 circ.mil capacity were installed during 1920. But during 1921, when rail renewals were made with 100-lb. steel, it was decided to increase the capacity of bonds to 400,000 circ.mil.

The laying of 100-lb. steel using heavy joint plates necessitated the development of a Webber type bond of 400,000-circ-mil capacity which could be applied with the bonding machine. For the purpose of comparing results, 38-in., 400,000-circ.-mil cable bonds are also being installed. These are passed through the space between the plate and the web of the rail and the terminals welded to the head of the rail. For the same reason a few 400,000-circ.-mil steel terminal Webber type bonds are to be installed, using a metal electrode in welding.

The four rails are cross-bonded every 500 ft., the cross-bonds being stapled to the ties and covered up in order to discourage theft. About 40,000 bonds have been applied during the past three years.

Crossing signs and center wig-wag installation

Another type of auto-flag warning more generally used on this line

Typical automatic substation on North Shore Line

We have forty-eight highway crossings protected by gates, thirty-five by auto-flag or wigwag signals and twelve by bell signals. The signals are operated on 600-volt current, using rail contactors for control. The total maintenance cost on the auto-flags and bells is approximately $10,000 per year.

POWER IMPROVEMENTS OF GREAT IMPORTANCE

When the reorganization of the company took place in 1916, a careful study was made of the power conditions on the property, having in mind needed improvements and a construction program to take care of future demands. At this time seven manually operated substations were in operation on the main line, spaced approximately 13 miles apart, and one at Libertyville on the Libertyville Branch.

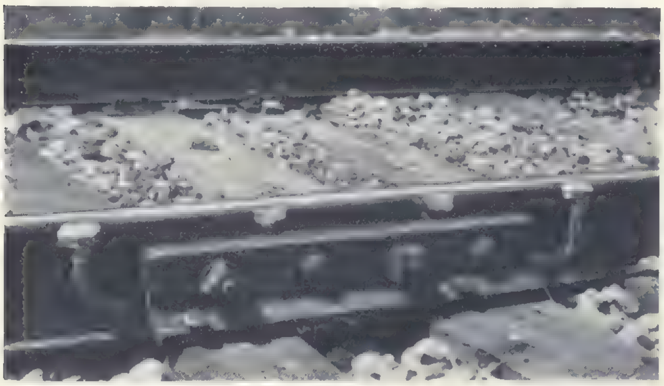
It was estimated that if sufficient copper was to be added to give satisfactory voltage conditions, it would be necessary to install approximately 177 miles of 500,000-circ.mil cable at an approximate cost of $650,000. Changing the trolley voltage would necessitate the scrapping of many old type, 600-volt motors which were in use, and it was thought inadvisable to carry 1,200 volts on the trolley going through the numerous towns.

After having considered the problem from its various angles, it was decided that automatic substations should be placed midway between the manually operated stations. Designs and plans were adopted only after a study had been made of the automatically operated stations in use on other properties.

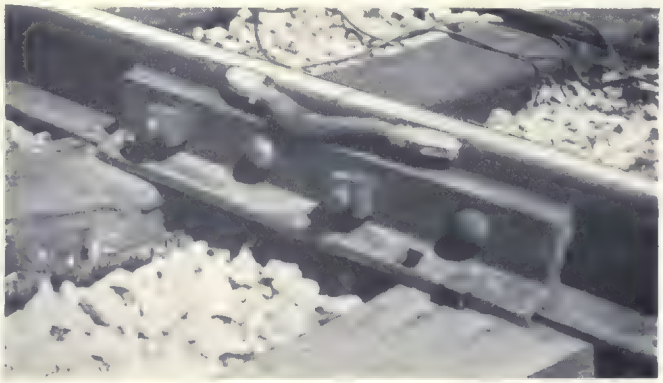
Two 500-kw. stations were put in service during 1917, one during 1918 and one during 1921. One of the two 300-kw. machines at Libertyville was equipped for automatic operation during 1920 and the first 500-kw. installation was changed this year to a 1,000-kw. station. Today we have one 300-kw., three 500-kw. and three 1,000-kw. stations automatically operated. Two (1,000 kw. each) are 60 cycle and the others 25. Six are of the inclosed type and one semi-inclosed.

The buildings are of fireproof construction, roomy enough to permit of the installation of machines of greater capacity and, in general, the arrangement is such that extension can be made and additional or duplicate equipment installed to harmonize with the arrangement of the present equipment.

These seven stations, spread over a territory covering 60.5 miles as seen on the map in a previous general article on the North Shore Line, are inspected daily and given general care by a force consisting of three men as compared to the twenty-one operators required for the seven manually operated stations. The operation is checked by means of recording charts and mechanical counters installed on different parts of the equipment. While we look for improvements, the present automatic equipments have our unqualified indorsement, for aside from the savings accomplished in labor, distribution losses, copper and idle running time, the machines are not subjected to the abuses which sometimes obtain in manually operated stations. It is estimated that the efficiency of distribution has been increased from 20 to 25 per cent. On account of the rapidly changing service conditions it is difficult to make accurate comparisons, but a self-evident fact is that without these additions to converter capacity we could not operate our present service.



38-in. welded cable bonds on 100-lb. rail



Webber type bond developed for welding on 100-lb. rail

Building Track and Right-of-Way to Create Traffic

By J. S. HYATT
Engineer Maintenance of Way
Chicago, North Shore & Milwaukee Railroad

How the Chicago, North Shore & Milwaukee Railroad Has Within a Short Time Reconstructed the Track to Make a High-Grade, Smooth-Riding Roadbed — The Elements of Contented Track Employees, Clean and Safe Right-of-Way and Attractive Station Facilities as Important Traffic Producers Are Treated—A Practical Article for Way Engineers

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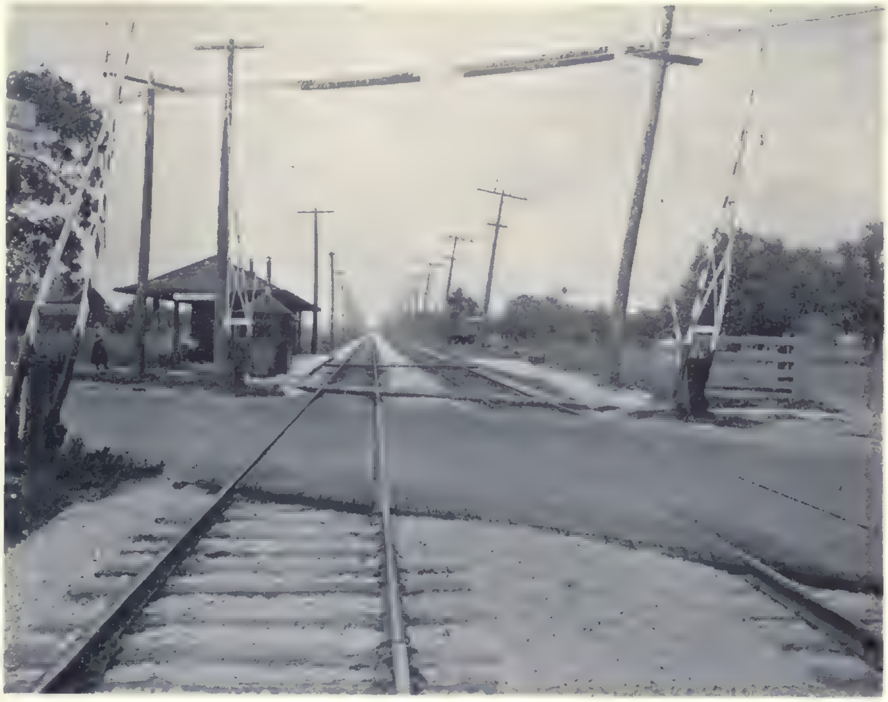
Standard unit type framed road crossing as built on North Shore Line

ROAD MEN are not generally looked upon as aids to the traffic department or as advertising agents, but we believe a very important and valuable element of their worth is lost when this viewpoint is overlooked.

A safe, easy-riding and good appearing track is fundamental in obtaining and retaining traffic. The most effective selling organization that can be produced in a railroad will be ineffective, if the track and its maintenance are not what they should be. The road men are therefore a most important factor in producing traffic. With the ever-present pressure for economy it is vital that the small groups of workers who are handicapped by the scattered locations of their work and the interruptions of weather be efficiently organized and supervised, if the best results are to be obtained. When the necessity for reducing operating expenses comes on a railroad the first place in which it seems easiest to reduce expenses is the road work, This means the neglect of the very foundation upon which rest all the efforts of the railroad to carry on its business.

We believe the history of the North Shore Line very forcibly illustrates this fact. Built (in its main essentials) as a first-class interurban railroad capable of carrying high-speed service, under the policies of the eight or nine years of the receivership the advertising features of smooth roadbed, clean, well-kept right-of-way, clean and convenient station facilities and satisfied and enthusiastic employees were so overlooked that the traveling public was beginning to fear the neglect of the essential maintenance duties which insure safety.

The improvements on the North Shore Line that have so aided in the increase of its revenues commenced with the elimination of all wooden trestles and temporary bridges and the purchase of steel rolling stock. Coincident with the elimination of these bridges, and in fact as a part of this improvement, the narrow stretches of roadbed on high fills approaching these bridges were widened. The first steps taken in improving the drainage conditions were in the deep and long cuts, done by widening these cuts and by digging deep and ample ditches with an "American" ditcher. We also proceeded at once upon a plan of producing a safe, smooth-riding track that would carry the high-speed steel cars of the North Shore Line without fatigue or anxiety to patrons. The essential elements of such a structure are known to all. Our plan was simply one that would be used by any intelligent engineer.

The ties were immediately brought to a high state of maintenance by a liberal policy of renewal and, thanks to the faith and foresight of the management, we were able to requisition and obtain ties of the best type and durability, ties of no lower grade than a No. 3 white oak being used, and many of our ties were red oak, creosote-treated, until the conditions of war times made it impracticable for us to get good creosote oil for treatment.

Much of the rail was of very light weight and badly worn through long use under light maintenance, and a plan was immediately put in effect of renewing all of this light rail with 80-lb. and 100-lb. rail. Such of the old rail that was heavy enough and in suitable condition for rehabilitation was supplied with new angle bars, rebolted, properly spaced and anchored.

Following immediately upon these preliminaries, an extensive plan of reballasting was inaugurated. The road was originally ballasted with 24 in. of gravel ballast but this ballast, a large part of which was of the cementing type, had been allowed to become so fouled with weeds that its drainage qualities were greatly impaired, and so it was immediately recognized that it would be necessary to lift the track out of this ballast and overlay it with a more substantial and porous type of ballast. Due to the immediate necessity to get the road in good riding condition and because of the high cost of the better types of ballast such as slag and stone and the difficulites of obtaining them, and also with the idea in mind of using a method that would more effectively kill the weeds and leave the sub-ballast in a contour that would improve drainage, the easily obtained cinder output of a steel mill on our line was contracted for. The old ballast was first put under the ties and the track resurfaced on cinders, widening out the ballast bed with these cinders to form a liberal shoulder to receive the later application of stone or slag ballast. We have found this method admirably adapted to the treatment of cementing gravel and very economical in the amount of stone later required. We found that the clay in the cementing gravel would work up through a very thick layer of stone ballast. But where the track was treated with the light cinder lift, the drainage and the supporting character of the sub-ballast were so improved that a lighter layer of stone ballast was quite as effective. This plan also enabled us to get over a great many more miles of track immediately and put it in good riding condition, though of course the final expense will be somewhat greater than the direct application of stone ballast.

In all of our track design, drainage has had to receive first consideration, as the soil throughout the whole line is one that is quite impervious to water, and in some sections is of such a character as to give us a great deal of trouble when not properly drained, particularly at the north end of the line where a great many of the cuts are very deep and long. These vary in length from ½ to 1½ miles, and in depth from 20 to 30 ft. Even the wide and deep ditches constructed with our American ditcher did not seem to meet the situation here, and all of these cuts have been subdrained by a double row of tile laid in a trench 3 to 4 ft. deep and backfilled with cinders.

MAKING THINGS ATTRACTIVE FOR TRACKMEN

Our full program of improvement was begun just about the time that the world war was commanding the majority of our labor and when it was most difficult to obtain adequate help. We were forced rather by necessity than by choice to establish an entirely new system of caring for our men, but the results have proved so advantageous that it is certain we will never go back to the old-time methods.

In place of the box car with its contract commissary and all the privations, inconveniences and irritations attendant upon it for the men, we established at convenient locations permanent camps where our men could be adequately housed with ample space per man, protected by proper means from flies and vermin, furnished with clean bedding and bath. We established our own commissary, fed the men ourselves, not for profit but for satisfaction, and devised a method of furnishing a hot lunch on the job at noonday, thus eliminating the one drawback of the permanent camp. The installation of such a camp seemed at first an extravagance; and we doubt, if it had not been for the necessities of the times, whether we would have had the courage to go ahead as we did, but the returns that we have received in lower turnover, better class of employees, and more work out of satisfied employees, has proved the wisdom of the expenditure.

As a natural sequence of this experience and as a result of some of the lessons taught by the war and a desire to develop foremen from our force, to replenish the decreasing number of trackmen available for these positions, we employed a Y. M. C. A. man and established an Americanization and Foremen's School among our trackmen. While these schools were primarily designed to perfect safety by teaching the English language and to train men for foremen's positions by showing them the right way to do work and the reason for it, they have had a very great value in getting the men and the supervisory force together, in changing the ideals of the foreign element in our track gangs and increasing the general interest in the work among all the track employees.

These schools were started at convenient locations along the right-of-way, taking up first Roberts' Lessons in English at an evening session held for each class twice a week. These lessons were supplemented with a study of the Constitution of the United States and the fundamentals of our government, so that any of our men were able, as soon as they wished, to take out their citizenship papers. They were then further extended into simple instruction in grammar and arithmetic and matter having particular reference to the daily work.

The foremen's school was an outgrowth of the Americanization school for the benefit of the more intelligent men and the foremen, at which they took up the various problems connected with the maintenance of way, such as drainage, installation of ties, care of right-of-way, keeping of records and reports, duties of foremen to their men, and kindred subjects regarding which the foremen should be well informed. These classes have been supplemented with music and songs and motion pictures to give them life and interest. Educational films of the universities were very largely drawn upon, instructing the men in safety work, sanitation and prevention of disease. The foremen's classes were largely illustrated by lantern slides of actual examples of good and bad work on their own and adjacent sections of the North Shore Line.

Both in these foremen's classes and in the execution of our daily work, we have tried to emphasize two features of the maintenance of way work, namely, systematic work programs and systematic clean-ups.

KEEPING THE RIGHT-OF-WAY DRESSED UP

Killing weeds and keeping the right-of-way in neat condition is a matter that gives all a great deal of concern, some not so much as it should, for there is nothing that will impress the traveling public more favorably than a clean right-of-way. A weedy one always leads one to feel that the property is poorly maintained. This work involves a very large expenditure, and if it is done by the usual hoe and shovel method it takes the labor from the track maintenance at the time when it is most needed. We have obviated this drain very largely by the use of chemical weed killer. After going through the usual experimental stage, we have come to the conclusion that the proper method of treating is to have our own treatment cars and our own storage tanks, thus enabling us to make more frequent applications and make them at the proper time. A caustic arsenic solution is used. The cost per mile of weeding by this method has been reduced to approximately 25 per cent of the hand method. This is partly accounted for by the policy followed of frequent light treatments rather than fewer heavy applications.

STATION FACILITIES MADE PLEASING

In considering the advertising features of the maintenance of way, the question of station facilities, crossing protection, or the construction of highway crossings have not been overlooked, as at these points the railroad makes its first impression on the public. During the last few years the North Shore Line has greatly improved its station facilities. Terminal stations have been built both in Chicago and Milwaukee that have enabled the road to give much improved service to its through patrons. But its improvements have not been limited to these expensive terminal facilities, as many minor improvements have been made to all stations along the line.

Cleanliness has been greatly stressed, and although a station has but little traffic and is very small, the utmost has been done to keep it in a clean and satisfactory condition for our patrons. To this end has been inaugurated a thorough system of janitor service under ample supervision. Stoves have been installed even in the way stations where no agents are in attendance and a liberal application of paint has kept the appearance of the stations in a cheerful and well-maintained condition.

The safety of the patrons has been constantly thought of in planning and improving these stations. This frequently has involved the moving of stations from one side of the road to the other, or of moving them back from the tracks. Stations sufficiently important to justify an agent have been largely rebuilt, providing ample office room, proper toilet facilities and in many cases the installation of concessions operated by the railroad company. Regular sanitary inspection has tended to keep all employees responsible for the maintenance of these stations on the job, thus insuring station facilities that the patrons are pleased to use.

With the inauguration of the merchandise dispatch service, many additional facilities were required, and these stations, team tracks and teamways have all been constructed, not with the idea of building them as cheaply as possible, but with the idea of building a structure that will serve and attract the shippers.

In improving our highway crossings, considerable thought is given to the amount of highway traffic that they will have to carry. It is our policy to make these crossings a little wider than the adjacent highway is likely to be. In order to get the maximum life from these crossings, we have adopted the standard policy of not having any joints in the crossing, and when a new crossing is placed, all ties under it are renewed. We construct these crossings of 4 ft. x 6 in. treated maple heart plank, frame them and cover the wearing surface with a coat of tarvia and sand. We find that the riding qualities and length of life are greatly improved by this treatment. For less traveled crossings we find that the Headley crossing makes a very good substitute for the plank, and is much less costly. This crossing is made of crushed stone treated in a concrete mixer with Headley's "Good Road Oil." This is a patented asphalt emulsion which solidifies upon drying out, thus rendering the whole mass a monolith in a few days.

SAFETY AT GRADE CROSSINGS

The safety of the employees and the public has not been overlooked by the maintenance of way department. Fully 75 per cent of our crossings have been protected in the last four years. This means every crossing between Evanston and Waukegan, and all of the more important ones in the more sparsely settled district between Waukegan and Milwaukee. Practically all of these gates are of the wire-pull type, designed by our own engineers and built from our own patterns in nearby foundries and assembled in our own shops. In a few instances where gates could be controlled by interlocking towermen without additional expense, the electric gate has been installed on account of the ease of its control from a distant point.

The right-of-way has been thoroughly marked by crossing signs and station boards and by permanent slow-speed boards at all points where the physical condition constantly requires reduced speed. These boards are placed at the motorman's right, usually 1,000 ft. back from the point of reduced speed, and the maximum speed allowed is noted so that even a motorman not familiar with the road will have little difficulty in properly taking a train over the North Shore Line.

Each section gang is provided with slow boards and slow lights and all other signals, and by frequent drills and safety meetings these men are kept familiar with the proper methods of protecting themselves while at work and of advising train crews of sections that need caution in traversing. A systematic patrol is kept over the whole road so that any defect in track structure is detected early.

Since the reorganization of the company, the expired franchises in Waukegan, Lake Forest and Highland Park have all been renewed. In the first city, all the track in city pavement has been reconstructed, our franchise requiring brick pavement. Our standard type of construction has been 91-lb. rail on International or Dayton ties, with thermit rail joints laid on 6 in. of concrete foundation. We have felt it advisable to subdrain all this track structure, and this has been done by a longitudinal line of pipe which in double track is supplemented with branch lines in herringbone formation. By this method we have very successfully prevented track that has previously given us much trouble from settling out of surface.

In Lake Forest and Highland Park, where the right-of-way was almost entirely on the street previous to the granting of the new franchise, under the terms of these franchises the right-of-way has been obtained and the streets moved so as to give the railroad a private right-of-way 80 to 100 ft. in width, and the city a street with unobstructed pavement.

These improvements have all materially aided the elimination of slow speed points and largely made possible the inauguration of the two hour and ten minute service between Chicago and Milwaukee by the Interstate, Badger and Eastern Limiteds, and have done much to justify the slogan, "The Road of Service."

Moving Cars by Telephone

Practically All Operating Matters as Well as Other Business Clears Through a Central Switchboard in Main Office of Chicago Surface Lines -- Operators Act as Division Superintendent in Emergency

THE Chicago Surface Lines has a very thorough and practical system for dispatching aid or instructions to any location where a blockade or breakdown has occurred, or for doing the proper thing immediately in any emergency. The focus of this system is a telephone switchboard located in the office of the superintendent of transportation in the Borland Building, where the downtown main offices of the railway are located. Each operator is more than a person who merely connects one circuit with another. Each one has a clear mental picture of the whole railway system and knows immediately the nearest wreck wagon to any trouble or delay that arises. In case of traffic tie-up, the operator temporarily exercises the judgment of a division superintendent by advising how to get around the trouble. In the case of more serious trouble or accident, the situation is turned over to the general superintendent.

The switchboard consists of two positions, and from 8 a.m. to 5:30 p.m. two operators are normally on duty. Into this board come the circuits from the twelve division headquarters, in each of which is located a small private branch exchange board that connects with the box telephones located all over the system. The board is also provided with eleven incoming and seven outgoing trunks to the city telephone system. Lines are also provided to other parts of the system such as the west and south side shops, the engineering office on the north side, the claim and legal department on the west side, the various operating officials and executives of the road in the Borland Building, and the three headquarters of the line repair trucks, and to numerous other points of activity on the system. All the substation telephones on the city system must be reached through trunks to the city exchanges.

In any trouble or emergency the procedure is for the conductor to go to the nearest telephone in a store and call Randolph 0581. The operator immediately calls the nearest trouble wagon, which proceeds to the scene of the delay and in the meantime the nearest car station is called to send a supervisor or inspector. If the wrecking crew finds that the trouble is too serious for it to handle in short order, a call is put in immediately for help. The operator then dispatches the proper piece of equipment to the location.

As soon as the cause of any trouble or delay has been removed, the wrecking crew calls the switchboard, giving the time that the track was cleared and the number of the car or cars that were delayed. The operator keeps a record of all delays, which shows the location, time, nature and time consumed by the depot from which the wreck wagon was sent. On this same form are also recorded the facts about any other dispatching that is done, such as the line repair wagon or the ambulance in case of an accident.

In the switchboard room is a fire alarm ticker which gives notice of all alarms that are turned in. After the operator has read the number on the tape, he calls the depot in whose territory the fire is, and a supervisor is immediately sent out. If the supervisor finds that hose bridges are necessary to keep the cars running, he immediately calls back and the operator dispatches the necessary equipment.

The operator, besides having a clear mental picture of the system, is also familiar with the police precinct districts, the location of hospitals, etc. In the case of accident, it is the operator at the central switchboard who gets the claim department on the job, and if necessary sends an ambulance from the nearest police station. When a heavy rainstorm floods the subways under the railroad viaducts, it is the operator who notifies the track department. It would be almost impossible to list or classify the multitude of emergencies, both large and small, that are handled through this central switchboard. The operators have an intimate "speaking" acquaintance with all the personnel of the system and always know where any man can be found. Besides taking care of the work in connection with keeping the system operating, they also answer many calls from people who wish to know where to apply for lost articles, from those who want to know how to get from one place to another on the surface lines and from others asking for miscellaneous information or who have business with any company official. This one switchboard is the central clearing house for nearly all matters of or pertaining to company affairs.

Chicago Tunnel Handles Excavated Material

THE Chicago Tunnel Company, which owns and operates 62 miles of underground tunnel lying under the central portion of Chicago, has been removing a great deal of excavated material from building sites with its tunnel trains during the last few years. This unusual method has relieved the streets of much truck haulage and furnished a cheap and handy way for disposal of the excavated material.

In deep foundation work and in excavations for basements and subbasements of large buildings, it is a common practice to sink an inclined shaft or chute to the tunnel under the site, the tunnel being enlarged or having a spur for a siding to enable a car to be set under the chute.

The tunnel system is an electrically operated freight railway of 2-ft. gage. The tunnel is of oval section about 7½ ft. high and 6 ft. wide with the rail level approximately 45 ft. below the surface. It was built particularly for freight-handling service and connects numerous freight railway stations with commercial houses, department stores, warehouses and office buildings.

The tunnel traffic averages about 10,000 cu.yd. of excavated material monthly, 7,500 cu.yd. of ashes from buildings and power plants, 4,000 cu.yd. of coal to these plants, and 45,000 tons of merchandise handled to and from railway freight houses. The coal business was formerly much larger, but of late the larger coal companies have maintained fleets of motor trucks for the delivery of their own coal. The tunnel cars are of 3½ cu.yd. capacity and are used for hauling the excavated material, refuse and ashes. Trains of from six to eight cars of such material and twelve to fifteen cars of freight are handled at an average speed of 8 m.p.h. by electric locomotives, of which 110 are now in daily service. The average haul to the disposal station is 2½ miles.

The Severity of Chicago's Traffic Problem

and Observations on Measures of Relief in Use or Applicable Generally in Large Cities

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OF THE MANY perplexing problems which add to the difficulties confronting operating officials of street railways in our large cities, the regulation of vehicular and pedestrian traffic is of growing importance. Business districts are daily congested, the movement of cars is impeded and operating costs rise while service declines as the speed of cars is diminished.

The street widths, which were satisfactory in earlier years, are no longer adequate for the ever-growing volume of traffic. Henry Ford a short time ago made a statement that should demand a more thorough study of our traffic problems. He estimated the automobile saturation point for the United States at 30,000,000 motor cars—nearly three times the number of cars now in use. If traffic conditions render the operation of street cars difficult today what can be expected when Mr. Ford's saturation point is reached?

In large cities the cost of delay in handling traffic is an enormous charge against all kinds of business, and in Chicago this loss probably runs over $25,000,000 per year. The present space between curbs has been reduced one-third or one-half of its useful width, by devoting valuable street space to parking.

The first step to minimize obstruction due to unlimited parking has usually been to permit parking for one hour, and the second step has usually been to reduce the time period to thirty minutes or to fifteen minutes. While these changes and regulations are intended to facilitate traffic movement, it appears that the contrary result has been achieved. In order to conform with time limits drivers either move a short distance or jockey for place at the curb and consequently burden the streets with useless mileage and also obstruct the movement of through traffic.

In large cities the parking space is usually occupied almost completely.

State and Madison Streets, Chicago, between 12 and 1 p.m.

Limited Period Parking Tends to Increase Congestion—Complete Prohibition Has Drawbacks, But Is the Best System—Pedestrian Movements Are Better Uncontrolled

* * *

The delays and obstructions to traffic which arise from the pulling in and out of parking spaces are considerable, and these are rarely given adequate consideration in determining the authorized period for parking. The importance of this factor is shown if we consider, comparatively, parking periods of various lengths on a twelve-hour basis. A period of one hour permits twelve changes; of thirty minutes, twenty-four changes; fifteen minutes, forty-eight changes for each vehicle. And it must be remembered that in each change there are two moves—out and in.

The complete prohibition of parking during the rush hours, while necessary and desirable, causes a considerable amount of "cruising" on the part of private cars, which adds to the congestion and at the same time increases the number of right and left-hand turns. However, this restriction should be enforced as its benefits are far greater than the objectionable cruising.

The complete all day prohibition of parking in the central business district in any city, while ideal from a traffic point of view, works a hardship on certain classes of business and inconvenience to motorists unless adequate and convenient parking spaces are provided.

The prohibition of parking on some of the streets in the business district is criticised as it results in discrimination as between merchants located on non-parking streets and others located in the same general area where parking is permitted.

Parking for an unlimited time results in the exclusion of all persons desiring to do business who arrive after the parking spaces are filled.

The south end of Dearborn Street Bridge, Chicago, looks like this at 9 a.m.

In Chicago the available parking space at the curb in the Loop district will provide for the standing of 3,700 cars. As there are nearly 250,000 cars in the Chicago territory, the validity of this criticism is at once apparent.

Traffic regulations have grown rapidly and their present forms are many and varied—frequently mystifying to drivers—and their complexity often adds to rather than reduces confusion. Multiplicity of ordinances does not add to the effectiveness of regulation, but rather emphasizes the lack of proper education of drivers.

Because of such abundance of rules, the courts become clogged and general disregard for traffic rules increases. Consequently we must do more in the way of educating the public to observe at all times the ordinary rules of the road and to develop a natural road courtesy which will bring about improvement in traffic movement and increase the comfort and safety of all. Many out of hand suggestions are made to improve conditions at a bad point which usually result in producing new points of congestion, for reasons shown in tables that follow, giving the variation in traffic density at different locations on the same street.

Few people have any idea of the volume of traffic in our dense centers of activity. Here in Chicago there are points where on normal days 2,000 vehicles pass through a street intersection in an hour, and in the same period at the same place 26,000 to 30,000 pedestrians cross the intersecting streets from curb to curb—more than eight persons per second.

VARIATION OF VEHICULAR TRAFFIC ON A NORMAL WEEK-DAY AT DIFFERENT INTERSECTIONS OF THE SAME THOROUGHFARE

On State Street 4 p.m. to 5 p.m.	North and South	East and West	Total
At Lake	670	615	1,285
At Randolph	839	858	1,697
At Washington*	880	1,084	1,964
At Madison†	979	682	1,661
At Monroe	909	800	1,709
At Adams	993	405	1,398
At Jackson	994	1,005	1,949
At Van Buren	930	506	1,436
At Harrison	813	507	1,320

* 26,000 pedestrians in same hour.
† 30,000 pedestrians in same hour.

Note:—At Washington Street the east and west traffic is 55 per cent of the total, while at Adams Street it is only 29 per cent.

On Jackson Boulevard 5 p.m. to 6 p.m.	North and South	East and West	Total
At Wabash	957	890	1,947
At State	775	839	1,614
At Dearborn	460	904	1,364
At Clark	620	1,242	1,862
At Wells	650	1,167	1,817
At Franklin	502	1,499	2,001

Note:—At Franklin Street the east and west traffic is 75 per cent, while at Wabash Avenue it is 46 per cent.

On Washington Street 4 p.m. to 5 p.m.	North and South	East and West	Total
At Wabash	906	1,090	1,996
At State	880	1,084	1,964
At Dearborn	531	874	1,405
At Clark	709	967	1,676
At La Salle	740	1,074	1,814
At Wells	587	1,075	1,662
At Franklin	693	940	1,633

Accompanying graphs show respectively the hourly volume of passenger and commercial vehicle traffic flowing outbound from the Loop district, an area of about 0.49 square mile. The volume of all traffic and the passenger carrying value of the different vehicles are estimated as follows:

	Number	Passengers
Horse-drawn vehicles	14,500	14,500
Motor-driven vehicles	17,180	17,200
Total commercial vehicles	31,680	31,700
Passenger autos	42,130	84,300
	73,810	116,000
Street cars	8,360	330,000
	82,170	446,000
	Number	Passengers
Vehicles, per cent	90	26
Street cars, per cent	10	74
	100	100

The above percentages show conclusively that, where such conditions exist, the traction officials and the patrons of their service have an unquestionable right and interest in the traffic problem, and that all sound regulation must take into consideration all classes of the traveling public.

Signals of different types are installed with a view of controlling and speeding up traffic, and after trial

On Washington and Clark Streets, Chicago, between 5 and 6 p.m.

are said to be a great improvement. Usually this idea has no real foundation for the reason that no record was made of actual conditions prior to the installation. Lack of real knowledge of facts brings about honest, though mistaken, opinions. Accurate records, therefore, should be made by municipalities. Only with continued study of fairly large areas will it be possible to handle intelligently the growing traffic, minimize the delays to car riders, and prevent loss to the railway companies and to business interests.

GREATER UNIFORMITY OF SIGNS AND SIGNALS

At the present time signs of every conceivable size and description are installed to secure the same result. Caution and danger lights are many and various. It seems most obvious that simplicity and uniformity in signs and in color of lights is highly desirable and that efforts should be made to secure the adoption of a nearly universal system as to these details.

But as to general plans of traffic control, it must be realized that nearly every city has its peculiarities in street layout, in street spacing and in general topography. The volume of traffic varies on adjacent streets and there is a marked difference also in the traffic density and character in the various sections of the same street. Therefore no general rule can be broadly applied to our large cities. Because certain regulations prove very successful in one city does not warrant the conclusion that they will be helpful elsewhere.

During the recent street car strike one-way traffic was adopted for the business district and it was found that these heavy intersections carried 3,000 vehicles in an hour, indicating that the absence of street cars added 50 per cent to our street capacity.

From observations made then it appears that one-way traffic, in congested areas, increases the hazard to pedestrians and adds to the mileage of vehicles. A condition arises at street intersections where only the near-side crosswalks permit a free movement of pedestrians, the others being blocked by the turning of vehicles from lanes which occupy the full width of the street. The density of traffic at these turns delays the movement of pedestrians and consequently the near-side crosswalks are forced to carry an unusually large volume of foot traffic.

Traffic at the junction of Halsted, Milwaukee and Grand Avenue, Chicago, at 5 p.m.

It is to be regretted that we have not been able to check normal two-way traffic in the Loop district in the absence of street cars, thereby having conclusive comparative data at our disposal.

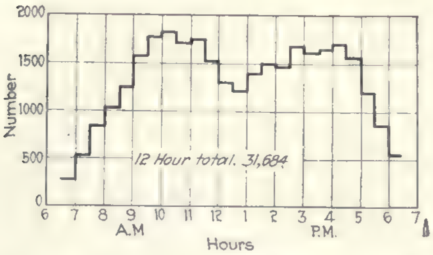
In Chicago the traffic division of the Police Department has attempted several times to control the pedestrian movement by the whistle signals which govern the vehicle movement. These experiments resulted in extreme congestion and the results were not satisfactory.

Our conclusion is that, owing to the density of pedestrian traffic, the best means of handling both classes of traffic is to permit the pedestrians to filter through the traffic without obeying the whistle signals, although there may result a slight slowing up of vehicles. This is our present practice and accidents in the Loop are nil.

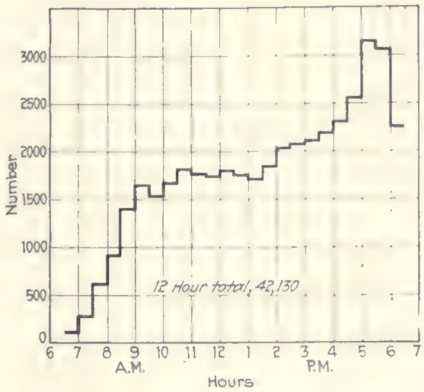
SPEED OF TRAFFIC ON MICHIGAN BOULEVARD

Michigan Boulevard has recently been improved by widening and by the installation of a double-deck bridge, separating heavy and light traffic. About $16,000,000 was spent in constructing this improvement. Today many complaints arise on account of traffic conditions on this thoroughfare, the usual complaint being based upon the low speed of automobiles. An accompanying chart shows the actual condition, giving the average speeds for the non-rush hours

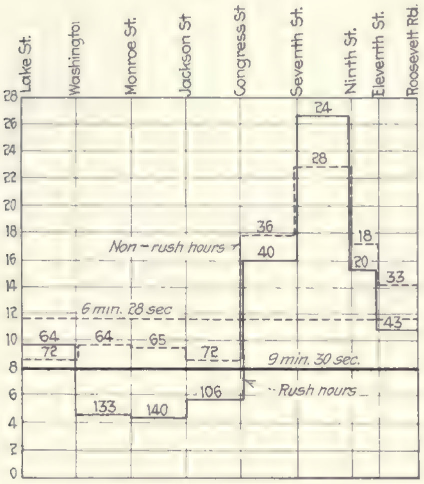
Madison Street at Wells, 8:30 a.m.



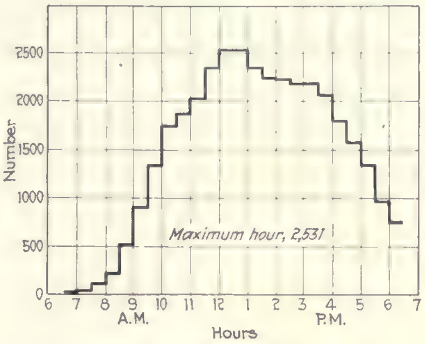
Outbound flow of commercial vehicles from Loop



Outbound flow of passenger vehicles from Loop



Average speed of automobiles along Michigan Avenue, m p.h.



Automobiles parked on streets withtin the Loop

and also for the rush hour (5 p.m. to 6 p.m.) based upon several thousand observations. While these average speeds may not be all that is to be desired, yet when the volume of traffic (nearly 5,000 cars per hour pass a given point in the rush hour) is considered, it is evident that traffic conditions are really not as bad as the casual observer believes.

Another chart reproduced herewith shows the average speed of vehicles in the rush and non-rush hours between the various street intersections on Michigan Boulevard. The extremely low speed shown between Jackson Boulevard and Lake Street is due to the ebb and flow of traffic from the Loop district into this great artery, and the situation is further complexed by the movements of cars to and from the Grant Park parking space east of the Boulevard, where upward of 2,500 motor cars are stored daily. Delays to traffic on Michigan Avenue affect the adjacent streets in the Loop, for within a comparatively few minutes, a temporary blockade on Michigan Avenue is felt on the cross streets two, three and four blocks west.

Perhaps the foregoing discussion will serve to emphasize the essential need that accurate records be made for purposes of future comparisons and that traffic be continuously studied, so that as its growth rises to meet the estimate of Mr. Ford, railway and city officials will be equipped to cope with the situation. By this means alone can efficient regulation be achieved.

Dearborn Street Bridge, Chicago, at 9 a.m.

The Chicago elevated railroads have 1,664 cars, and in 1920 the average cost per car for maintenance was $1,202. In 1914 the average cost for maintenance per car was $497.

Materials Quantities in Surface Lines Electrical System

THE following compilation showing the amount of materials which comprise the electrical distribution system of the Chicago Surface Lines is interesting because it transmits energy to a network of more than 1,000 miles of track, on more than 90 per cent of which the voltage ranges between 550 and 600 during rush-hour conditions and the remaining 10 per cent is practically all above 500 volts. This is the condition that exists when there is also a considerable electric car heating load.

Substations	Number	Number of Machines	Total Capacity, Kilowatts
Chicago Surface Lines..........	20	67	142,400
Commonwealth Edison Company	12	33	105,000
	32	100	247,400
Positive System			
Weatherproof cables, all sizes.......			934.5 miles
Lead covered cables, all sizes........			537.6 miles
Conduit..........................			1,500.7 miles
Manholes..........................			3,285
Negative System.			
Weatherproof cables, all sizes.......			57.1 miles
Straight track auxiliary cables......			594.3 miles
Special trackwork cables............			138.2 miles
Tap to "L" structures.............			2.6 miles
Overhead System.			
Trolley, all sizes..................			1,034.6 miles
Trough..........................			46.7 miles
Poles—iron......................			41,682
Poles—wood......................			4,194
Poles—total......................			45,876
Electric switches..................			124

* Other than street railway load is also supplied from these substations.

The record for the number of cars entering the Loop in one hour on the Chicago Elevated Railroad was made on April 29, 1920, when 953 ran into the Loop in sixty minutes.

Arkansas Utilities Association

ON ACCOUNT of conflicting dates with other conventions, the executive committee of the Arkansas Utilities Association has changed the convention dates of the association from Oct. 9-10, 1922, to Nov. 7-9, 1922.

The convention will have headquarters at the Arlington Hotel, Hot Springs, National Park, Ark.

Investment Bankers' Association of America

THE eleventh annual convention of the Investment Bankers' Association of America is to be held at the Del Monte Hotel, Del Monte, Calif., Oct. 9-12. There will be reports from committees on the following subjects: Finance, membership, railroad securities, education, marine securities, municipal securities, public service securities, real estate securities, fraudulent advertising, publicity, irrigation securities, foreign securities, government bonds, business practice, industrial securities, legislation and taxation.

American Welding Society

THE fall meeting of the A.W.S will be held in Chicago, Monday, Oct. 2, to Thursday, Oct. 5. On Monday afternoon, all day and evening Tuesday, and Wednesday morning there will be papers and reports on welding practice. For Wednesday afternoon a joint meeting with the American Electric Railway Engineering Association is scheduled, with papers by C. A. McCune, president, and William Spraragen, secretary American Welding Society, and E. M. T. Ryder, way engineer, and J. S. McWhirter, superintendent of equipment Third Avenue Railway System. On Thursday morning there will be a meeting of the committee on welded rail joints on the Municipal Pier. Members of the A.W.S. will meet at the Hotel Morrison at 6 p.m. Wednesday for a get-together dinner.

Association Safety Activities to Be Co-ordinated

A MEETING of a joint committee representing the National Electric Light Association, American Electric Railway Association, American Gas Association, Pennsylvania Electric Association and the Bell Telephone interests was held during the Safety Congress at Detroit last month and means of co-ordination and prevention of duplication of the work of the safety and accident prevention committees of the several groups were discussed. The discussion developed the fact that many of the studies carried on are of common interest, and while the work of the individual committees cannot be interfered with some means of keeping intimate touch between the several committees is a necessity. After discussion of various methods a committee was appointed to prepare and submit for approval a plan that would meet the ideas expressed in the discussion.

American Association News

Judge Warwick and H. A. Wheeler Will Address Convention

A NOTABLE feature of the meeting of the American Electric Railway Association on Wednesday morning will be the address by Judge Walter Winter Warwick, whose acceptance has just been received by Charles C. Peirce of the committee on meetings and subjects. Judge Warwick was Comptroller of the Treasury during the war years of from 1915 to 1921. He has also been Judge of the United States Circuit Court, Associate Justice of the Supreme Court of the Panama Canal Zone, and a member from April, 1911, to May, 1913, of the President's Commission on Economy and Efficiency. He is now Assistant Director of the Budget, with headquarters at Washington, D. C.

Judge Warwick's topic will be "The Financing of Electric Railways."

Another prominent speaker who will address the convention on Tuesday morning is H. A. Wheeler, vice-president Union Trust Company of Chicago. Mr. Wheeler was formerly president of the United States Chamber of Commerce. Mr. Wheeler's topic will be "The Busines Situation."

Claims Association Program

THE complete program of the Claims Association was made public this week, together with certain convention committee appointments. The latter are as follows: Convention assistants to the president, G. T. Hellmuth, Chicago, and H. O. Allison, New Brighton, Pa.; resolutions, W. H. Hyland, Gloversville, N. Y.; registration, H. D. Briggs, Newark, N. J.; entertainment, Wallace Muir, Lexington, Ky., and T. B. Donnelly, Connellsville, Pa.; reception and acquaintance, C. B. Proctor, Memphis, Tenn., and S. J. Herrell, Knoxville, Tenn. The program follows:

MONDAY MORNING, OCT. 2

Registration.

MONDAY AFTERNOON

HONORARY CHAIRMAN, J. R. GUILLIAMS

Invocation.

Address of President.

Report of Executive Committee.

Papers and Addresses

A Welcome.

"The Dignity and Fundamentals of Claim Work," By J. R. Guilliams, general attorney, Chicago Surface Lines.

"The Minimizing Expenditures Through Co-operation of Trainmen in Obtaining Observers," By P. O. Solon, claims attorney San Francisco-Oakland Terminal Railways.

"Personal Specifications for Claims Men," by H. O. Allison, safety engineer Beaver Valley Traction Company.

"Titles Which Suggest and Encourage Claims," by W. F. Weh, superintendent accident department, Cleveland Railway.

"Acts of Management and Operation Which Affect Claims," by J. W. Giltner, chief claim agent Northern Ohio Traction & Light Company.

"Claim Department Practices Which Encourage Claims," by Walter E. Robinson, claim agent Cincinnati Traction Company.

"Budgetary Procedure in Claims Expenditures," by John J. Reynolds, claims attorney Boston Elevated Railway.

"The Psychology of a Smile" (a presentation), by Augustus Baker, chief of adjustment bureau Receivers of Pittsburgh Railways.

"Clerical Routine and Forms" (an exhibit).

Resolutions.

Announcement of special features.

Distribution of souvenirs.

TUESDAY AFTERNOON

HONORARY CHAIRMAN, W. F. WEH

Papers and addresses

"How to Organize a Local Safety Council," by Charles B. Hardin, general claim agent United Railways of St. Louis.

"How to Organize Company Employees for Accident Prevention," by Victor T. Noonan, superintendent department of accident prevention, Cleveland Railway.

"How to Decrease Accidents without Special Organizations." by B. F. Boynton, claim agent Portland Railway, Light & Power Company.

"The Physician's Part in Accident Prevention" (author to be announced later).

"The Effect Upon Claims from Accident Prevention," a symposium by the following:

B. D. Haskins, claim agent and director of safety work, Chattanooga Railway & Light Company.

Neil W. Funk, superintendent of claims Louisville Railway.

L. A. Edwards, chief claim agent the Pennsylvania-Ohio Electric Company.

H. J. Vosburgh, claim agent Rochester, Lockport & Buffalo Railroad.

J. J. Sharkey, claim agent New York State Railways Rochester.

Nathan Abelson, claim and tax attorney, Empire State Railroad Corporation, Syracuse.

R. S. Messenger, claims and tax agent, Wilmington & Philadelphia Traction Company.

Thomas G. Aston, claim agent Washington Water Power Company, Spokane.

H. G. Winsor, superintendent of investigations and adjustments, Tacoma Railway & Power Company.

R. H. Hatfield, claim adjuster Sioux City Service Company.

Albert W. George, general claim agent The Connecticut Company, New Haven.

"The Prevention, Investigation, Adjustment and Defense of Automobile Accidents and Claims," a symposium by the following:

Edwin J. Paige, claim agent United Railways & Electric Company of Baltimore.

C. M. McRoberts, chief claim agent Los Angeles Railway.

A. E. Shaw, chief claims agent Montreal Tramways.

George H. Conklin, claim adjuster Augusta-Aiken Railway & Electric Corporation.

R. B. Campbells, general manager Arkansas Valley Interurban Railway Wichita.

Charles A. Blackburn, claim agent Butte Electric Railway.

Charles B. Prugh, claim agent Columbus Railway, Power & Light Company.

F. J. Gatrell, general claim agent Chicago Surface Lines.

E. F. Wynne, claim agent Georgia Railway & Power Company, Atlanta.

E. M. Raver, claim agent the Lincoln Traction Company.

Charles Oldenburg, general claim agent Chicago & Interurban Traction Company.

V. J. Waltz, claim agent Community Traction Company, Toledo.

Resolutions and Special Announcements.

Wednesday Afternoon, Oct. 4

Honorary Chairman, J. H. Handlon, Esq.

Papers and Addresses

"Women Jurors," author to be announced later.

"Tricks and Crimes of Ambulance Chasers," by Joseph S. Kubu, formerly secretary of the Claims Association and by John W. Yenson, claim agent Third Avenue Railway, New York.

"Exorbitant, Contingent Fees of Attorneys and Doctors, Their Effect and Legal Aspects," by Squire, Sanders & Dempsey, attorneys at law, Cleveland.

A Message from the American Bar Association.

A Message from the American Medical Society.

A Message from the Association of Railway Claim Agents.

A Message from the International Claim Association.

"Our Experience and Opinions," a symposium by the following:

B. J. Kernan, New Orleans, La.
Roane Waring, Memphis, Tenn.
C. E. Pickett, Waterloo, Iowa.
W. P. Napier, San Antonio, Tex.
W. W. Smithers, Philadelphia, Pa.
George H. Gordon, LaCrosse, Wis.
E. A. Nell, Kansas City, Mo.

"Jury Systems and the Need for Revision," author to be announced later.

Resolutions and Special Announcements.

Thursday Afternoon, Oct. 5

Honorary Chairman, John J. Reynolds

"The Economic Aspect of Claims Expenditures," by William G. Fitzpatrick, general claims attorney Detroit United Railway.

"The Result of 350 Jury Trials" (with graphic charts), by William G. Marshall, chief of litigation bureau, Receivers of Pittsburgh Railways.

"The Female Plaintiff with Subjective Complaints," by James Whitney Hall, medical legal expert, Chicago.

"Medical Testimony in Defensive Litigation, with Some Suggestions to Physicians," by William A. Challener, general attorney Receivers of Pittsburgh Railways.

"Medical Defense of Litigated Claims, with Some Suggestions to Trial Attorneys," by John Leeming, M. D., medical counsel, Chicago Surface Lines.

"Inspirational Review and Outline of Probable Trend of Claims Work," by J. H. Handlon, claim agent Market Street Railway.

"Report on an Association Code of Ethics," by R. A. Sears, general claims attorney Boston Elevated Railway.

Adoption of Revised Objects of the Claims Association.

Report of Resolutions Committee.

Election of Officers—Installation.

Appointment of Committees.

Adjournment.

Interurban Round Table

THE program for Thursday, Oct. 5, of the Transportation & Traffic Association shows an "interurban hour" at 3 p.m., in charge of E. C. Spring, general superintendent Lehigh Valley Transit Company. Below will be found the program of this discussion received from President L. H. Palmer, with the request that it be published in advance because of the potential value to be realized if the interest taken measures up to the topic itself.

"Meeting Highway Competition"—This subject should bring out the unfair conditions of competition, also the point, can the automobile be made a stimulant to interurban traffic?

"Economics in Operation"—This subject should bring out the savings of car mileage and platform labor, together with dead or layover time and plotting of schedules.

"Getting Increased Passenger Business"—This subject should bring out the necessity of publicity, together with such publicity mediums as are used.

"Getting Increased Freight Business"—This subject should bring out the necessity of publicity development the same as passenger business, together with comparative rates and service with steam roads.

"Developing Favorable Public Sentiment"—This subject should bring out the capitalizing of public good will and the commercializing of the industry.

"The Necessity for Departmental Cooperation"—This subject should bring out the close touch one department should have upon the other and the results accomplished by working together. Using the entire pay roll as a booster for the service. Having all realize they are part of the whole.

As this note is printed, the following have accepted invitations to take part in this round-table discussion: F. L. Butler, C. E. Morgan, H. A. Nicholl, F. D. Norviel and E. S. Wilde.

Standard Committee Passes on Technical Reports

AT A meeting of the Engineering Association committee on standards, held in New York on Sept. 7, those parts of the technical reports which required action by the committee were considered in detail. The reports brought up were those on buildings and structures, power distribution, way matters and equipment.

The committee recommended that plans of typical shop layouts, prepared by the committee on buildings and structures, be adopted as miscellaneous methods and practices and printed thus in the Manual. The subject of good current practice in the design and construction of small bridges, culverts and trestles was referred back to the technical committee for the formulation of suggestions as to standards.

Under the subject of power distribution it was decided to recommend the suspension of the present specifications for crossings of electric light, power supply and trolley lines with steam and electric railways, in view of the revision of the National Electrical Safety Code which is now under way.

A long list of recommendations by the committee on way matters was approved. These involved detailed changes in specifications with a view to harmonizing them with existing practice, and six new specifications for railroad spikes, bolts and tie plates.

A number of suggestions by the committee on equipment, particularly as to wheel contours, were referred to the convention for action.

The meeting was attended by the following members: Martin Schreiber, chairman; N. B. Trist, C. G. Keen, C. H. Clark, John Lindall, J. A. Brooks and H. H. Norris. The committees were represented thus: way matters, H. H. George and R. C. Cram; power distribution, M. B. Rosevear, C. R. Harte; equipment, H. A. Benedict (representing R. H. Dalgleish), Daniel Durie. G. C. Hecker was secretary.

Special Arrangements for Railroad Tickets This Year

THOSE intending to get the benefit of the reduced rate to and from Chicago should be sure to secure identification certificates from the association office before purchasing their tickets. The usual plan by which identification certificates can be obtained at any ticket office is not being followed this year. The certificates to be obtained from the association office permit the purchase from any railroad office of a round-trip ticket to Chicago for a fare and one-half. After arriving at Chicago the delegate must have his ticket validated by an agent of the railroad, who will be at the Municipal Pier. The ticket is good going to Chicago from Sept. 26 to Oct. 4, and is good for return until Oct. 12. On the New York Central and Pennsylvania Railroads the ticket is not good either going or returning on the 20th Century Limited or the Broadway Limited respectively.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Politics Dragged Into Strike

Buffalo Company Carrying 100,000 Passengers Daily—Traffic on Many Lines 90 per Cent Normal

With the approach of the fall election, politics are being dragged into the strike of employees of the International Railway, Buffalo, N. Y., which has been in effect since July 1. Mayor Frank X. Schwab has thrown his support to candidates indorsed by the strikers, the jitney owners and the Nickel or Walk Club, which has been organized to fight for a reduction in the railway fare.

Despite the mud-slinging campaign with the International Railway and Mitten Management, Inc., as the targets, the number of passengers being carried on all local and interurban lines of the company is constantly increasing. Herbert G. Tulley, president of the company, says the company is now carrying more than 100,000 passengers daily and that riding is 90 per cent normal on a large number of the West Side lines in Buffalo. It is predicted that if the percentage of increase is continued, car riding will be normal on all lines within another four or five weeks.

Among the candidates indorsed by the strikers, the jitney owners and the Nickel or Walk Club is Robert C. Lacey, chairman of the board of arbitration of the Central Labor Council and former president of the organization, who is under arrest charged with the illegal possession of dynamite. The arrest was made at the time four strikers were taken into custody after the wrecking of the Buffalo-Niagara Falls high-speed line car by dynamite. Mr. Lacey is a candidate for the State Senate from a Buffalo district. Among other candidates indorsed by the strikers and running on a platform for home rule, the abolishment of the Public Service Commission and recall of judges is Leo F. Tucholka, an opponent of the International.

Unable to secure the necessary support and co-operation of the Police Department under Mayor Schwab, the International Railway is endeavoring to round up practically single-handed the jitney drivers who are operating illegally. Scores of arrests have been made by employees of the railway who have been sworn in as special officers. The arrests are made upon warrants issued by the City Court upon information obtained by International Railway employees who have secured the evidence against the jitney drivers. Fines ranging from $25 to $250 have been imposed upon those convicted and yet hundreds of jitneys are plying their trade unmolested by city police.

A second injunction against jitney drivers has been obtained by the company from Justice Pooley in Supreme Court. It names 624 individuals and was granted upon application of Henry W. Killeen, counsel for the International. The purpose of the second injunction is to cover the cases of suspected jitney drivers, who are not named in the first injunction. Justice Crosby had ruled that the first injunction applies only to those persons specifically named in the court order and cannot include "all others" as stated in the reading of the injunction.

By unanimous vote the City Council of Buffalo adopted a resolution appropriating funds for the legal battle to be started by the municipal authorities to force a return of the 5-cent fare on the local lines of the International. About $75,000 will be required to continue the fight before the Public Service Commission. The City Council was advised against proceeding with a rate case at this time especially in view of the fact that the Public Service Commission will take the earnings of the company for the last several months as a basis for a fare readjustment and as the company has had little revenue from fares during this period, an 8 or 10-cent fare might be fixed by the commission.

Despite the warning of the city's legal staff, the City Council voted to start the rate case and directed the city's legal department to begin a preliminary action for a lower fare. The Council voted to employ an expert to make an investigation into the financial condition of the railway and conduct a survey of its physical properties which will be used as a basis of a rate case.

$3,000,000 in Improvements Depending on Franchise Vote

As an opening gun in a campaign to have the people of San Diego vote favorably at the special election to be held Oct. 10 on the Sixteenth Street franchise and the proposed charter amendment to relieve the San Diego Electric Railway of paving costs in future, John D. Spreckels, president of the railway, has issued a statement in which he promises that the company will spend $3,000,000 in San Diego in extensions and improvements if the concessions asked are granted and the company is given "a fair chance to do business under modern and reasonable conditions."

In his statement Mr. Spreckels said that his railway as a public utility was simply seeking a franchise which will relieve it of obsolete requirements. He said that a negative vote on the franchise issue would compel the railway to fall behind while all other utilities were making plans with future prosperity on every hand.

Electrification Accepted

Alternative Proposal of Mr. Hobson to Equip Texas Steam Road Approved by Dallas

The city of Dallas has approved the proposal submitted by C. W. Hobson and his associates for the electrification of the Missouri, Kansas & Texas Railroad from Dallas to Denton and its use as an interurban. The offer from Mr. Hobson was made in lieu of constructing the second interurban of 30 miles in length which Mr. Hobson and other grantees of the street car franchise at Dallas agreed to build under the terms of the contract entered into with the city at the time the franchise was granted in 1917. Mr. Hobson and associates are to enter into a fifty-year contract with the Missouri, Kansas & Texas, and the work of electrifying the line is to be begun by Oct. 1. Service is to be begun by the summer of 1923.

The question of carrying out the work was put squarely up to the City Commissioners and the Mayor of Dallas. The Dallas Railway is under bond to build an interurban at least 30 miles in length out of Dallas, work to begin this month, and C. W. Hobson has posted with the American Exchange National Bank, Dallas, a certified check for $350,000 as forfeit to guarantee the carrying out of the contract for a new interurban line.

After the traction people had investigated the proposition to electrify the Missouri, Kansas & Texas from Dallas to Denton and had made surveys and estimated costs, etc., Mr. Hobson formally notified Mayor Sawnie Aldredge and members of the City Commission that the traction interests would forfeit the $350,000 if the city declined to accept the Katy electrification project in lieu of the new interurban line which they are under contract to build.

Sentiment in Dallas seemed divided as to whether the city should accept or reject the Katy electrification project. Some people suggested that the project be rejected and that the $350,000 forfeit money be taken and used to acquire and equip a large park near the city. Others suggested that the forfeit money be accepted and used as a nucleus for a fund to be used in building an interurban line from Dallas to Greenville.

Mr. Hobson in notifying the city of the determination to forfeit the $350,000 submitted a draft of the proposed contract between the interurban interest and the Missouri, Kansas & Texas Railway. The contract gives the interurban interests a lease on the railway line for a period of fifty years with exclusive rights for hauling passengers, while the steam railway retains the right to haul freight.

Voters of Grand Rapids Approve New Franchise

Eighteen Months Consumed in the Negotiation of Terms Which Have Been Overwhelmingly Approved at Polls—Initial Fare Ten Cents Cash

A NEW electric railway franchise, effective for thirty years and carrying many unique provisions, has been granted the Grand Rapids (Mich.) Railway as a result of an election held there on Sept. 12. The measure was drawn up jointly by representatives of the municipality and the company. The nature of the grant was such as to require a three-fifths majority to assure passage. When final results of the election were known, however, it was found that the majority for the franchise was nearer four-fifths. Out of seventy-three precincts in the city, seventy-one carried the measure.

In the course of an interview with a representative of the *Electric Railway Journal*, Louis J. De Lamarter, vice-president and general manager of the company, made the following statement:

> The result of the franchise vote is particularly gratifying in view of the fact that at no time since the citizens of Grand Rapids have had the franchise under consideration has the railway given the public to understand that passage of the measure would bring an immediate reduction in fare or prompt improvement in service. We have indicated, to be sure, that the defeat of the grant would entail further financial hardships on the company and render still more difficult the expansion and development of our properties.
>
> We, therefore, are more than pleased with the spirit of co-operation and fair play manifested by the people of Grand Rapids in so stanchly supporting the measure. We feel, now, that the officials of the city, in collaboration with those of the company, are in a position to proceed with the solution of the various problems presenting themselves, and that the time is not far distant when Grand Rapids citizens may enjoy an improved transportation service.

Negotiations leading up to the enactment of the new franchise ordinance in Grand Rapids have been pending since the expiration of the old franchise on April 23, 1921. The factor which presented the knottiest problem to the group of experts representing both the city and company was the equitable valuation of the property. The city was unwilling to accept the valuation figures presented by the management of the company and the company maintained that the city's figures were altogether too low. Nearly a year's time was spent in threshing the matter out, the company holding strong for an $8,000,000 valuation, as contrasted with $5,100,000, the figure named by the city. The company finally agreed, however, to accept a compromise valuation of $5,500,000, provided the new franchise ran for thirty years, with an 8 per cent return. The company owns and operates extensive recreation grounds at Ramona and North Parks and these properties were included in the valuation.

The rate of fare to be charged was another knotty problem. Several methods were considered, ranging from the sale of one cash fare for 7 cents, four tickets for a quarter, to 10 cents cash fare and seventeen tickets for a dollar. This latter rate eventually gave way to the one now in effect, which provides that the initial fare shall be 10 cents cash and that seven tickets shall be sold for 50 cents. The new franchise stipulates that the present rate shall continue until the company's earnings exceed 8 per cent, whereupon the rate of fare shall decrease, step by step, as earnings increase, until a minimum fare of 5 cents shall have been reached with thirteen tickets for 50 cents. It also is provided, however, that, regardless of earnings, the maximum cash fare shall not be more than 10 cents. The intermediate rates are 10 cents cash and four tickets for a quarter, 10 cents cash and nine tickets for 50 cents, 10 cents cash and five tickets for 25 cents, 5 cents cash, 5 cents cash and eleven tickets for 50 cents, 5 cents cash and six tickets for 25 cents, 5 cents cash and seven tickets for 25 cents. On the rate of return the grant provides:

> The grantee's initial rate of return on the value of its property as determined under Sections 16 and 17 of this franchise shall be 8 per cent per annum. The grantee's rate of return shall be decreased one-quarter of 1 per cent whenever the rate of fare shall be increased one step as hereinafter in this section defined; when the cash or ticket fare in effect shall be less than 5 cents the return to the company shall be increased one-quarter of 1 per cent for each step the same is reduced.

CITY HAS PURCHASE RIGHTS

Another important provision of the franchise is that the city is given the right to purchase all of the company's properties after fifteen years or at the end of any five-year period thereafter or at the expiration of the franchise, the purchase to be negotiated on the basis of the present valuation or any valuation figure hereinafter arrived at, allowance being made for depreciation as well as additions and improvements.

The company is required to make monthly reports to the city and the company's books always are to be open for inspection by the city's authorized representatives. The city also is given the supervision of the salaries paid the company's officers and the company is enjoined from securing any indirect revenue whatsoever.

It is provided in the new franchise that any essential differences or disputes arising between the city and the company shall be settled by arbitration, the arbiters to be equally representative of both factions and their decisions to be final and conclusive.

The city has absolute jurisdiction over service, being empowered to fix the frequency with which cars shall run on all lines.

Ever since the provisions of the new franchise were made public, following approval by the City Commission on June 12, 1922, the measure has received the unqualified support of every forward-looking organization in Grand Rapids. All of the city's newspapers, the Chamber of Commerce, Rotary Club, the Trades and Labor Council and several business associations devoted their whole-hearted efforts to campaign activities in behalf of the franchise.

During the campaign Mr. De Lamarter played an open hand with all his cards on the table and the election results are interpreted as clearly demonstrating the people's appreciation of such tactics. As an after-election editorial in a Grand Rapids paper stated, "the people are fair when appealed to fairly."

FARE EQUALIZATION FUND PROVIDED

The provisions of the grant covering the fare equalization fund established is as follows:

> Sec. 21. The grantee, as soon as this franchise goes into effect, shall open a bookkeeping account denominated "Automatic Fare Equalization Account" hereinafter referred to as the "Equalization Account." The grantee shall thereafter credit the "Equalization Account" with all income received from the operation of the property and from all other sources, including the earnings on any reserve funds accrued subsequent to Jan. 1, 1922, or which may hereafter be set up, including all earnings on the net balance in said equalization account, in excess of the actual cost of operation as defined in Section 22, and shall debit said account with the return to which the said grantee is entitled under the provisions hereof.
>
> Whenever there shall be a net debit of more than $50,000 to the equalization account, then the next higher rate of fare and the next lower rate of return shall be and become effective; whenever there shall be a net debit exceeding $100,000 to the equalization account, then the next higher rate of fare and the next lower rate of return shall be and become effective and the rate of fare shall be further increased from time to time in like steps until the debit to the said equalization account is wiped out. Whenever the net credit to the equalization account exceeds $50,000 the next lower rate of fare shall be and become effective; whenever the net credit exceeds $100,000 the next lower rate of fare shall be and become effective and all amounts to the credit of the equalization account in excess of $100,000 shall be used as a basis for further reductions in fare and in like steps.
>
> All increases and all decreases in the rate of fare shall be made on the first day of the second month following the one in which the results of operation show that such increase or decrease is demanded under the terms hereof; Provided, however, the grantee in order to avoid frequent changes in the rate of fare or an increase in the rate of fare which in its judgment may decrease its gross earnings, may to such an extent as it may be able or deem expedient, and subject to the approval of the City Commission, refrain, from time to time, from debiting the equalization account the full return to which it may be entitled, but to such extent as it does so refrain it shall be entitled to debit said account, without interest, before a reduced rate of fare shall be established under the terms hereof. Any tickets outstanding when change of price thereof is made shall be redeemed by the grantee at the price at which the same were sold.

Another Effort to Restore Service in Saginaw

Another effort is to be made looking to the resumption of electric railway service in Saginaw, Mich. Initiatory petitions are being circulated calling upon the Council to submit to the voters at the general election on Nov. 7 a franchise ordinance to Otto Schupp, trustee in bankruptcy of the Saginaw-Bay City Railroad. The term of the grant is twenty-five years. Mr. Schupp represents the holders of more than $400,000 of first mortgage bonds on a property that has not been in operation since Aug. 10, 1921.

Under the terms of the proposed ordinance the rates of fare for the first two years are to be: twenty tickets $1, four tickets 25 cents, 10-cent cash fare, free transfers. After the expiration of the initial two-year period, the rates are to be fixed by the State Public Utilities Commission. The operators of the property agree to rebuild certain of their tracks next year, keep the pavement between the tracks in repair and operate motor coach extensions to various parts of the city not served by the electric railway.

Jitney bus and intercity motor bus competition along the lines of the Michigan Railroad is prohibited.

It is further provided that in case of any disagreement between the city and company that can not be adjusted amicably the question in dispute is to be submitted to the Public Utilities Commission for settlement. The city is to have the right to purchase the railway property at any time at a price to be fixed by arbitration. The company is not to be required to pay for paving or repaving other than the extra ballast required because of the presence of its tracks in the streets.

Five-Mile Interurban Extension by Pacific Electric Railway

Announcement has been made by D. W. Pontius, vice-president and general manager of the Pacific Electric Railway, that application will be made immediately to the California State Railroad Commission for authority to extend the company's Monrovia-Glendora interurban line from Glendora to San Dimas, which is approximately 5 miles. This proposed extension will close up the gap between the Monrovia-Glendora Line and the San Bernardino Line.

The new extension will be constructed as soon as permission is received from the Railroad Commission. When completed it will shorten the route from South Pasadena, Pasadena, Sierra Madre, Monrovia, Azusa and Glendora to San Dima, Pomona, Ontario, Upland, Riverside, Redlands and the San Bernardino district and will result in a considerable saving of time to passengers. It will also expedite freight shipments.

It is estimated that after the Railroad Commission acts favorably on the company's application work on the proposed extension will be started at once and that it will be completed within four or five months. The expenditure to be made for carrying out this work will be about $370,000. The construction of the line will be the first extensive addition to the electric interurban lines made by the company since before the war.

Prior to the war, the Pacific Electric Lines purchased the right-of-way for the purpose of making this line extension to a connection with the San Bernardino line at San Dimas; but during the war all railway construction was held up as a war measure. It has not been feasible to attempt any further construction prior to the present time.

Compulsory Arbitration Bill Introduced

A bill for the compulsory incorporation of labor unions and compulsory arbitration of industrial disputes has been introduced in the House by Representative Fairchild of New York and referred to the committee on labor, which will consider it at the December session of Congress.

The measure would provide that all labor unions be enrolled as "national unions" under the Department of Labor, for which purpose the bill would create the office of commissioner of enrollments, with an annual salary of $7,500 a year. Employers of more than twenty-five workers also would be obliged to enroll. A penalty in the form of a tax of $5 a year would be levied upon all members of unions not enrolled in the national union.

The national unions, to be organized according to occupations, would be obliged to write into their by-laws a provision against disturbing the regular commercial life of the country and agree to submit all controversies which cannot be composed by private negotiation to the courts of the United States and to accept their decision on final appeal without further controversy.

A violation of the latter clause would be considered a misdemeanor punishable by a fine of $5 a day and no employer would be able to hire a worker not a member of a national union on penalty of fine of $5 a day for each outside worker employed.

Differences in Ottawa Settled

F. D. Burpee, general manager of the Ottawa (Can.) Street Railway, and F. W. McRae, president of Amalgamated Division 279, signed an agreement on Sept. 14 which brings to a final settlement the differences between th railway management and the men. The settlement is based on the finding brought in about three months ago by the Board of Conciliation and Investigation and has nothing to do with wages. No dispute has arisen in this respect since the finding of the board which reduced wages 12½ per cent. This decision was referred to in the *Electric Railway Journal*, issue of June 3. The chief clause in the new agreement states that the company will treat with its men through their properly accredited representatives of the Amalgamated upon questions which may arise, including dismissals after suspension. It is understood, though, that the company reserves the right to treat separately with men who are not members of Division 279 of the Amalgamated.

Reported Rehearing Petition Will Be Denied

Denial of the petition of the city of Indianapolis for a rehearing of the case in which the Indiana Public Service Commission relieved the Indianapolis Street Railway from paying for paving between its tracks appears likely. The question is one of prime importance in Indiana, since most cities require the street railway to pave streets and keep in repair the paving between their tracks and 18 in. on each side. At the conclusion of the arguments, Edgar Blessing, a member of the commission who wrote the original order, said he personally favored denying the petition to reopen the case. It is regarded as likely that other commissioners will take the same attitude. Counsel for the railway declared that the commission, the Legislature and the city had no authority to compel the railway to pave between its tracks. He said there was sufficient authority for the city to provide for the paving out of the general fund.

The Sporting Mayor of Indianapolis

How times have changed! Recently while Mayor Lew Shank of Indianapolis adorned the Tippecanoe County Fair racetrack rail and rooted for Peter Hall, a trotting horse owned by his wife and others, the mayors and city attorneys of a score of other Indiana cities assembled in Indianapolis and formed the Public Utilities Committee of Indiana Cities, an organization Lew had demanded since his memorable citizens' march last spring on the Statehouse to denounce the Public Service Commission. Mayor John C. Quick of Muncie, with whom Lew joined in the call for the organization meeting, could not explain the Indianapolis Mayor's absence. He did not attribute Lew's lack of enthusiasm to the latter's "peace visit" to the commission's office the day before when Mr. Shank and the members of the Indiana Public Service Commission gave every evidence of having patched up their difficulties.

In the organization of the public utilities committee Mayor Quick was elected president, Taylor Groninger, corporation counsel of Indianapolis, vice-president, and J. N. Brissey, city attorney of East Chicago, secretary-treasurer. The committee will work in conjunction with the Indiana Municipal League, it was said. The movement was started this year when Lew fought a proposed merger of several electric companies and opposed increases in utility rates. The annual meeting will be held the first Wednesday in September each year.

Construction of Bay Shore Interurban in Prospect

Acceptance of the franchise offered by the City Commission of Houston to the promoters of the proposed new interurban electric railway is said to insure the construction of the line. John Henry Kirby, wealthy lumber manufacturer and oil operator; W. C. Munn, John S. Bonner and Jacob F. Wolters, all of Houston, are the organizers of the Bay Shore Interurban Railway Company, and they have given bond in the sum of $7,500 to the city for the faithful performance of the franchise and contract. Under the terms of the franchise, work on the new line must begin by March, 1923, and cars be in operation by the first of 1924.

The city of Houston will secure a franchise from Harrisburg which will permit the new line to connect with the tracks of the Galveston-Houston Interurban Company at the point where it leaves the tracks of the Municipal Belt Railroad.

The Bay Shore Line will use a quarter of mile of the Municipal Belt track and part of the right-of-way of the municipal railroad. Under the franchise the city has the right to purchase an interest in the right-of-way which will be secured by the interurban line beyond the Municipal Belt Railroad so that the railroad can be extended if the city should desire.

Subway for Tokio in Prospect

An underground electric railway will soon be part of the life of Tokio if plans now under way come to a successful termination. The Tokio Underground Railway, Ltd., recently issued a prospectus in which the fact was brought out that the electric railway operated by the Municipal Electric Bureau is insufficient to carry the vast throngs of people which have been increasing in alarming numbers.

The statement is made that the projected line of the underground railway is to have connections with the high-speed electric railway system operated by the government Department of Railways between the capital and Yokohama. The subway will be extended 9½ miles.

Board of Estimate Receives Mayor's Plan of Construction

In a recent statement to the Board of Estimate John F. Hylan, Mayor of New York, as part of his rapid transit construction program, has promised the construction of seven tracks within the next five years, which will relieve the present congestion on the upper west side. The first stage in the construction of the new west side line will be the operation of the line from Fifty-ninth Street and Seventh Avenue to Broadway and Dyckman Street. The next step will be the continuation of the line as a four-track main line south on Amsterdam Avenue from Seventy-second Street to the Battery and Brooklyn. The third stage will be the extension from Broadway and Dyckman Street to Yonkers. According to the Mayor's statement when these three stages are completed the city will have another four-track subway running through the entire west side with a two-track connection with the present Broadway subway.

It was announced at the second public hearing on Mayor Hylan's plan for new subways that estimated cost of constructing new west side line from Seventy-second Street and Amsterdam Avenue to the Battery is $31,000,000.

Wages Go to Arbitration

A typographical error, in which an entire line was dropped from the story on page 407 of the *Electric Railway Journal*, issue of Sept. 16, with respect to the wage controversy between the management and employees of the Boston & Worcester Street Railway, destroyed the sense of that item. The sentence should have read: "Several conferences were held previous to the expiration of the contract and it was agreed that all articles of the contract other than articles pertaining to wages were satisfactory." As indicated previously, the wage matter has gone to arbitration for settlement.

Joint Engineering Council Formed

Proposals have been approved by representatives in conference of the leading British engineering institutions for closer co-operation between these bodies. They are the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Naval Architects and the Institution of Electrical Engineers. An Engineering Joint Council composed of representatives of the four bodies has been formed. The objects in view are to improve the status of engineers, to secure the better utilization of their services in the country's interests, to secure the appointment of properly qualified individuals to responsible engineering positions and to prevent unnecessary duplication of activities.

Proposed Expenditures in Tennessee Total $2,000,000

Public utilities of Tennessee will spend more than $2,000,000 within the next year in improvements and renewals. Figures giving this amount have been supplied the State Utilities Commission following a resolution of the commission to review all construction plans and determine what progress has been made. The contemplated expenditures of the railway companies in the state are as follows:

	Estimated Sum to Be Spent During Current Year	Sum Spent in Past Six Months
Knoxville Railway & Light Company	$250,000	$136,000
Chattanooga Railway & Light Company	175,000	100,000
Memphis Street Railway	200,000	100,000
Tennessee Power Company	300,000	65,000
Nashville Railway & Light Company	300,000	100,000

Co-operative Welfare Association Entertains Employees and Their Families

On July 5 the Louisville (Ky.) Railway chartered the steamer *East St. Louis* for three trips of three hours each on the Ohio River for the employees of the company, their families and their friends.

There were 900 people on the morning boat, which left the wharf at 9:30 a.m. This boat carried the late trick employees and their families, as it was planned to give every employee of the company an opportunity to make the ride. Motion pictures were taken of a special car discharging passengers for the morning boat ride, of the people approaching and boarding the boat and also showing the *East St. Louis* backing out into midstream. These pictures are a part of a film that the company is preparing of all of its activities and will be shown at gatherings of employees during the fall and winter.

The offices and shops closed for the afternoon, and as many as it was possible to relieve went on the afternoon trip. There were 1,218 passengers on the afternoon boat, leaving the wharf at 2:30 and returning at 6 p.m.

The evening boat, leaving the wharf at 8 p.m. and returning at 11:30 p.m., of course, carried the largest crowd. The capacity of the boat being 1,800 people, the government inspector insisted on raising the gangplank after 1,775 people had boarded the boat. Quite a number were disappointed but other entertainment features carried out during the summer made up for the loss.

On July 7 there was a boat ride for the colored employees of the company on the steamer *America*, leaving the wharf at 2:30 p.m. and returning at 6 p.m.

On Aug. 2 Fontaine Ferry Park, an amusement resort on the Ohio River, was taken over by the company for an all-day outing for white employees and families. The park was opened at 10 a.m. and employees were urged to pack lunch baskets and bring the kiddos, wives, fathers, grandfathers and grandmothers and spend as many hours at the park as possible.

There was a program of music in the bandstand at 1:30 p.m. and 8 p.m., with a radio concert at 7:30 p.m., as well as contests for the boys and girls at 2:30 p.m. Moving pictures were taken of all events at the park.

Free tickets were provided, covering carfare to and from the park, admission to the park and rides on most of the amusement devices in the park.

Invites Public Criticism.—In an effort to render a faithful and efficient service to its passengers the North Carolina Public Service Company, Greensboro, N. C., has invited the patrons of its lines to send in service suggestions. Constructive criticism is sought as the first step toward improvements in the railway department of the company.

Financial and Corporate

Elevated Merger Sanctioned

Illinois Commission Has Approved the Chicago Merger—Move a Measure For Greater Simplicity

Permission was granted on Sept. 14 by the Illinois Commerce Commission for the proposed $76,000,000 merger of the Northwestern, Metropolitan and the South Side elevated lines and for the purchase by the consolidated corporation at a judiciary sale of the properties of the Chicago & Oak Park Elevated Railroad, which has been in the hands of a receiver since Nov. 13, 1911. A meeting of the stockholders of the three companies will be held later in the month to ratify the consolidation plan.

In citing benefits to be derived through the merger, the elevated railroads, in their petition filed with the commission last May, stated the lines could be operated more efficiently and economically as one company, and that the proposed consolidation would better the credit and raise the financial standing of the properties and enable the company to purchase new equipment.

One Hundred New Cars

The consolidation will permit the company to go forward with its plan of purchasing 100 new cars at a cost of $23,000 each. A petition to purchase the new equipment was filed with the commission a few days ago.

Britton I. Budd. president of the roads, said the consolidation will mean an improvement in service.

> We will start service with longer trains shortly after March 1, when delivery of the new cars will begin. Such service will be of great benefit to the public during rush hours. This involves lengthening of station platforms and several other physical changes.
>
> Because of inability to attract new capital and because of closed mortgages the elevated lines have not developed to anything like their potential ability to give the people the service which is the crying need of the hour. This is the first step in that direction.

The valuation of all the elevated lines for rate-making purposes as of June 30, 1919, was $86,250,000. Since then additions to capital have increased the value to $86,682,899. The proposed consolidation corporation is to have stocks and bonds of $76,106,500, which will be increased to $83,806,500 with the acquisition of the Oak Park line.

The merger will eliminate $2,936,815 of floating indebtedness and $2,984,581 of receivers' liabilities. The consolidated corporation is authorized to make a first lien and refunding mortgage of $1,600,000 and an adjustment income mortgage of $17,120,000, and to issue $19,172,500 in capital stock with which to retire the stock of the three companies and pay off indebtedness. It is also authorized to issue $2,600,000 in stock to cancel certain receivers' liabilities in connection with the purchase of the Oak Park "L."

Fails to Meet Cost of Operation

Owing to heavy reconstruction and other maintenance expenses the Boston (Mass.) Elevated Railway was unable to earn its cost of operation last August, falling $217,128 behind. It carried 26,877,682 revenue passengers of whom 6,001,000 were carried for the 5-cent fare and 20,876,682 for the 10-cent fare. The total receipts from operation amounted to $2,443,075 and the cost of the service was $2,660,204. The payroll cost per revenue passenger was 4.759 cents as against 5,287 cents in August a year ago. The cost of service per revenue passenger was 9.898 cents as against 10.546 cents in August last year. The trustees report that the work is well advanced on 100 new surface cars and shipments will begin at the end of September. Since Jan. 1 the company has overhauled and painted 571 cars and snow plows, as compared with 389 during the same period last year.

New Merger Bill

Another Measure Has Been Introduced Designed to Effect Consolidation of Washington Companies

A new bill for the voluntary merger of the electric railway and electric power companies of Washington, bearing the indorsement of the District of Columbia Public Utilities Commission, has been introduced in the House by Representative Focht. It is understood that this measure will be urged before the District of Columbia committee to displace the several other bills on this subject which are pending before that body, two of them having been passed by the Senate.

Voluntary Consolidation Proposed

The Focht bill would provide for the voluntary consolidation of all the railway companies of the capital city upon a vote of three-fourths of the stockholders of each of the separate corporations. It would provide that consolidation with the Potomac Electric Power Company could not be had as a separate merger by any of the individual railways, but would have to be effected, if at all, after the consolidation of the car lines. The measure also would provide means for consolidation of the Washington Gas Light Company and the Georgetown Gas Light Company.

Gross Receipts Tax Repealed

The 4 per cent gross tax on receipts would be repealed after July 1, 1922, and the bill would levy a tax of 50 per cent on net operating income in excess of 6 per cent and not above 7 per cent and a tax of 75 per cent on net operating income in excess of 7 per cent of the fair value of the property of all traction companies. The measure would relieve the traction companies, if consolidated, from paying the cost of street paving 2 ft. on each side of the tracks and between the rails and after consolidation would reduce the tax on net income to 4 per cent on gross revenue.

A clause in the new bill would empower the Public Utilities Commission to control the salaries of officials of the merged properties.

Conspectus of Indexes for Sept., 1922

Compiled for Publication in this Paper by

Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Peak	1913
Street Railway Fares*	Sept. 1922 **7.01**	Aug. 1922 **7.01**	Sept. 1921 **7.21**	May 1921 **7.24**	**4.84**
Street Railway Materials*	Aug. 1922 **189**	July 1922 **181**	Aug. 1921 **160**	Sept. 1920 **247**	**100**
Street Railway Wages*	Sept. 1922 **208**	Aug. 1922 **209**	Sept 1921 **215**	Sept. 1920 **232**	**100**
Steel Unfilled orders (Million tons)	Aug. 31 1922 **5.95**	July 30 1922 **5.78**	Aug. 31 1921 **4.53**	Apr. 30 1917 **12.18**	**5.91**
U.S. Bank Clearings Outside N. Y. City (Billions)	Aug. 1922 **12.34**	July 1922 **12.30**	Aug. 1921 **11.08**	March 1920 **18.54**	Av. Mo. 1913 **6.12**
Business Failures	Aug. 1922	July 1922	Aug. 1921	Jan. 1922	Av. Mo. 1913
Number	**1,669**	**1,568**	**1,642**	**2,722**	**1,213**
Liabilities (millions)	**36.83**	**42.15**	**50.38**	**105.7**	**24.64**

	Latest	Month Ago	Year Ago	Peak	1913
Eng. News-Record Construction costs	Sept. 1922 **185.0**	Aug. 1922 **173.4**	Sept. 1921 **188.3**	June 1920 **273.8**	**100**
U.S. Bur. Lab. Stat. Wholesale Commodities	Aug. 1922 **155**	July 1922 **155**	Aug. 1921 **142**	May 1920 **247**	**100**
Bradstreet's Wholesale Commodities	Sept. 1 1922 **12.08**	Aug. 1 1922 **12.07**	Sept. 1 1921 **11.09**	Feb. 1 1920 **20.87**	**9.21**
Dun's Wholesale Commodities	Sept. 1 1922 **172.5**	Aug. 1 1922 **173.6**	Sept. 1 1921 **162.6**	May 1 1920 **263.3**	**120.9**
U.S. Bur. Lab. Stat. Retail food	Aug. 1922 **139**	July 1922 **142**	Aug. 1921 **155**	June 1920 **219**	**100**
Nat. Ind. Conf. Bd. Cost of living	Aug. 1922 **154.5**	July 1922 **155.6**	Aug. 1921 **162.0**	July 1920 **204.5**	(1914) **100**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Traffic and Transportation

Read While You Ride

Newspaper Vending Machine Installed on Dayton Cars Attracts Attention from Railways Elsewhere

Increased interest has been aroused in other cities in the system of vending newspapers which has been in successful use on street cars in Dayton, Ohio, now for many months. The plan is known as the Read-Wyl-U-Ryd Street Car Selling Plan for morning papers. The two largest of the five street railways in Dayton at first agreed to install the system without any return to themselves, but the Dayton *Journal* subsequently agreed to give the companies a selling commission of one-half cent for each copy sold.

Both William L. Smith, general manager of the Dayton Street Railway, and W. E. Boileau are on record as being strong proponents of the Read-Wyl-U-Ryd boxes. In fact, in a letter to the Dayton *Journal* Mr. Smith said that he would gladly recommend the idea to any street or interurban railway. In granting permission to put the boxes on the cars of his company Mr. Smith said he did so because his action:

1. Afforded his patrons the opportunity to read the morning paper while riding to office or factory, which, from personal experience, was a pleasure and tended to shorten the ride.
2. Prevented his patrons being annoyed by newsboys, and, what was more essential, eliminated the possibility of an accident to such boys who carelessly and thoughtlessly jumped on and off the cars.
3. Added to the pleasant relations which existed between the press and the company, and further proved the desire of the railway to co-operate with the newspapers in giving "service" to the public.

Mr. Boileau said:

> The boxes have proved very popular with the car riders in the morning, enabling them to obtain the morning paper when they get on the car and they are thus enabled to read it while en route to their office. A great many of our passengers have commented very favorably on the enterprise of both the Read-Wyl-U-Ryd Company and ourselves. It is our opinion that the plan fills a long-felt want and the increase in the number of papers taken from the boxes each morning indicates their increasing popularity.

Thomas E. Howell, general manager of the City Railway, is also an advocate of the use of the system. In fact, the new system of vending the papers was the outcome of an order issued by Mr. Howell a year ago to keep all newsboys off the cars of that company. This order followed personal observation by Mr. Howell of a Dayton *Journal* boy who boarded a car at a regular stop, proceeded through the car and after selling several papers walked to the front, pulled the lever which opened the doors and jumped off while the car was in motion.

This order by Mr. Howell was a measure of self-protection by the railway manager, but it affected the circulation figures. Therein Mr. Howell had reckoned without taking into account C. D. O'Rourke, the circulation manager of the Dayton *Journal*. Mr. O'Rourke was quick to see Mr. Howell's stand from the safety point of view, and Mr. Howell was equally quick to see Mr. O'Rourke's point of view when the circulation manager suggested the self-service newspaper box idea, which Mr. O'Rourke has since fully developed.

New Interurban Rates Arranged

The Louisville (Ky.) Railway which operates the Louisville interurban lines as well, has arranged for a new form of tariff on its interurban lines. The rates are and have been on the basis of 3 cents a mile all along, but under the old method the fare to the city limits was figured at 5 cents. Now there will be a minimum fare of 7 cents figured from the city limits to any point inside of the city. From the city limits the lines will be divided into zones of one-third of a mile each, all stations within a given zone being given a number, which will also represent the amount of fare necessary to go to that station from the limits or from the city limits to the station. Then 7 cents is added to the station number on fares to the city depot. This system makes it easier for the conductor as well as customers to figure the fare, and is a more equitable basis for the customer in that the rate is 1 cent for a third of a mile plus the city fare.

Under the new plans going into effect on the local lines in the city of Louisville children under five years of age will be hauled free, the age limit having been raised from three years, at which it had been held probably from the time that street cars were first operated in Louisville.

Bargain Beach Days Increase Good Will

As an advertising feature and to give the families of workingmen a chance to enjoy the beaches, Claus Spreckels, manager of the San Diego (Calif.) Electric Railway, started "bargain beach days," when a flat rate of 10 cents for the round trip was granted every Thursday during August to any of the San Diego beaches. The move proved so popular that the first two Thursdays in September were also made "bargain beach days," and when Mr. Spreckels' attention was directed to the fact that many working people could not get away during week days, two Sundays in September, the tenth and seventeenth, also were included. This makes a round trip fare of 10 cents, from outer or inner zone, as compared with regular fares as follows: Coronado, outer zone, 25 cents; inner zone, 20 cents; Ocean Beach or Mission Beach, outer zone, 30 cents; inner zone, 25 cents.

Manager Spreckels announced that the plan had been a huge success and though it might not have shown a profit financially (returns not yet tabulated) it proved wonderful in adding to the good will toward the company.

Five-Cent Issue Falls Flat

Even ex-Governor Eugene N. Foss of Massachusetts Is Unable to Arouse People There—Issue Dead

Boston has had another 5-cent fare experience. It was promised by a number of politicians, including former Gov. Eugene N. Foss, that if they were elected to public office they would secure the 5-cent fare on the Boston Elevated. The side which had been clamoring for the nickel fare during the campaign did not figure very prominently in the primary election returns, but on Sept. 18 the issue came to a more clear-cut test.

PUBLIC HEARING POORLY ATTENDED

On that date the Massachusetts Public Utilities Department gave a public hearing on the 5-cent fare question, as directed by the Legislature, and found practically no representatives of the public on hand to advocate the idea. The commission waited a considerable time before anybody appeared at the hearing, except some railway officials, and Chairman Attwill commented on the fact that there had been so much talk about the fare reduction in the political campaign and now all the advocates of the issue seemed to desert it when a tribunal which had authority to act on it met to afford them an opportunity to discuss it on its merits. The commission had set aside two days, with two sessions each day, for the presentation of this cause, and nobody appeared to urge it or discuss it.

Only two speakers appeared. They were the city solicitor of Malden, who opposed the 5-cent fare as provided for in the bill which Mayor Curley of Boston presented to the Legislature, and the city solicitor of Somerville, who merely contended that a mistake was made in not holding the Boston Elevated Railway to the twenty-five year contract which provided for a 5-cent fare.

ISSUE WENT BY DEFAULT

Although the issue went practically by default the commission decided to give the public one more opportunity to come forward and discuss the fare situation, setting aside Sept. 21, for the purpose.

Council Condemns One-Man Cars

In a resolution passed by the Council of Clarksburg, W. Va., operation of one-man street cars in the city is condemned as being dangerous to life and health and as tending to reduce a service the public should have from a public utilities corporation. The city attorney was instructed to take such action as he deemed necessary against the Mongahela Power & Railway Company, which operates the electric railway system in this city.

Training Plan Successful

Efficiency Superintendent Describes Plan Which Has Improved Morale of Dallas Railway's Trainmen

Some time ago the Dallas (Tex.) Railway asked C. J. Crampton, director of the Dallas Chamber of Commerce, department of industrial efficiency and vocational training, to assist in the study and solution of its difficulties. Accordingly Mr. Crampton, who is now superintendent of the safety and efficiency department of the railway, made a detailed analysis of conditions and worked out, in lesson form, the various duties of trainmen. A capable superintendent of employment and training was employed with the understanding that he co-operate and carry out Mr. Crampton's plans. Employment tests were instituted. These included mathematical tests, general intelligence tests, sensory tests and sensory-motor tests. Each applicant was required to pass these before acceptance.

Twenty of the most expert motormen and conductors were selected as instructors. These men were ranked as "instructor," with a special cap band; their authority was increased. They were taught what to teach new men and how to go about the teaching. Instructors' meetings were, and still are frequently held. Students were sent only to regular instructors. A student under the new plan has but one instructor, who is entirely responsible for his training. This instructor takes him over every line in the city and teaches him all details of equipment and operation. Under this plan the time required to train an operator has been decreased from twenty to nine and ten days.

In writing about the system in the *Texas Industrialist* Mr. Crampton says that men trained under the new system are first taught to appreciate their job, and those who do not like it are encouraged to seek other employment at once. Courtesy and safety of operation are stressed at every point. After the student has mastered the duties of a trainman, he is approved by his instructor as fit for employment. He then passes a written examination which covers in detail the many phases of operation. These papers are preserved as an evidence, that he received proper training, and are an effective means of eliminating future excuses based on the plea of ignorance.

New men are employed for a three months' probationary period. During this time they report twice monthly to the superintendent of employment and training for review of their record and questions. At the end of three months' successful trial they are permanently employed.

Instructors are held responsible for the success of their students. Cumulative records are kept of each student and each instructor. On these records are noted such things as accidents, reckless actions, courtesy, unusual merit, etc. In this way the efficiency of instruction is stimulated and measured.

Mr. Crampton offers as a proof of the success of the plan statistics of traffic during the last State Fair. Approximately 50 per cent of the traffic during this period was handled by men trained under the new system. Traffic dangers were greatly increased by numerous strangers who were unfamiliar with the city. During the sixteen days of the fair there were only nineteen accidents that involved personal injury. None of these was serious. Not a bone was broken. On this basis the personal injury record represented one accident for each 190,000 passengers carried. On children's day, when free fair and railway tickets were provided, not a child was hurt.

Another Company Installs the Zone Pass

Since July 24 the Houghton (Mich.) County Traction Company has been using the unlimited ride, transferable weekly pass. The lines constitute what is practically an interurban railway, the chief headways being one hour or thirty minutes, although four cars an hour are operated between the twin cities of Hancock and Houghton.

Necessarily, the passes are sold on the zone basis. The rates are $0.98, $1.80 and $2.25 as against cash fares of 9, 18 and 27 cents respectively. Coincident with the installation of passes, S. B. Tuell, receiver, was permitted to discontinue the 8 cents per zone ticket rate.

As the passes were installed during the low-ride summer weeks and in a period of great depression, they have not yet had a chance to show what they can achieve in ride stimulation and revenue increase. However, with the pass sales equal to about 10 per cent of the total revenue, it is noted that the company without suffering any loss in revenue has been able to give a greatly decreased fare per ride to its regular customers. Walter Jackson co-operated with the receiver of the company in working out the rates and the publicity program.

May Adopt One-Way Traffic Plan

That one-way traffic in the city of Portland, Ore., must be tried in the congested district of the city was the consensus of opinion recently among City Councilmen. A resolution has been passed directing City Attorney Grant, Chief of Police Jenkins and City Engineer Laurgaard to make a survey of traffic conditions and prepare an ordinance requiring one-way traffic. The resolution was adopted without dissent. Mayor Baker introduced the resolution. Should the survey of traffic conditions develop that other reforms are necessary to relieve congestion on Portland's narrow downtown business streets such reforms will likely be included in the report. Although the plan of one-way traffic is expected to meet with some opposition, it appears that the Councilmen have determined to give it a fair trial.

Transportation News Notes

One Man Cars in Use.—The Port Arthur-Fort William Street Railway, Port Arthur, Ont., on Aug. 4 put into operation one-man cars.

One-Man Interurban Cars Started.—The Louisville (Ky.) Railway will start operating one-man cars on its Jeffersontown and Okolona interurban lines. Some of its cars have been remodeled so that passengers will enter and leave by the front door, and only one man will be required for handling the cars.

Traffic Decreases in August.—Figures filed with the Board of Public Utility Commissioners of New Jersey by the Public Service Corporation show fewer persons traveled on the company's lines in New Jersey in August than in July. Passengers in August numbered 34,370,155, compared with 36,666,407 in July.

15,644 Passengers to Bay View Beach.—According to the report of Superintendent Warwick of the Wisconsin Public Service Company on the operation of the Green Bay Park Railway leading to Bay View Beach, 15,644 passengers were carried in August. There were 9,758 paid fares and 5,886 passengers rode on transfers from city lines.

Three Cents a Mile Authorized.—The Indiana Public Service Commission has authorized the Union Traction Company to charge 3 cents a mile, with a minimum rate of 10 cents for rides within the city of Indianapolis. All traction lines entering Indianapolis now have a 10-cent fare. The old rate was 5 cents and placed the interurban lines in competition with the Indianapolis Street Railway lines.

Fares Reduced.—The Southwestern Traction Company, which operates an electric railway between Temple and Belton, Tex., with local service in both cities, has announced a 12 per cent reduction in fares between the two cities. The fare from Temple to Belton and from Belton to Temple has been reduced from 42 cents to 35 cents and fares between intermediate points in proportion.

Transfers to Settle Issue.—The Trenton, Bristol & Philadelphia Street Railway, Bristol, Pa., has informed the Borough Council of Morrisville that it is unable to run its cars from that place to Trenton, N. J. The Morrisville borough solicitor appeared before the Public Service Commission of Pennsylvania and asked that the company be made to run cars across the Delaware River Bridge. Minot J. Hill, general manager, stated that service was discontinued because the receipts did not meet operating expenses. The Pennsylvania & New Jersey Railway will issue transfers at 6 cents good on the Philadelphia line.

Personal Mention

D. J. Graham Goes to Youngstown

There's a new engineer of maintenance of way on the Youngstown (Ohio) Municipal Railway. He is Dale J. Graham, recently engineer with the American Steel Wire Company, Worcester, Mass., and before that with the Railroad Administration, and previous to that with the New York State Railways at Rochester, and before that with the Pennsylvania Railroad. This summary of Mr. Graham's activities accounts for all his time since he was graduated from the University of Pennsylvania in 1910 except two years with the Santa Fé Railroad in Kansas, Oklahoma and far Southern states. Mr. Graham's appointment was effective early in August.

J. P. Cantu is engineer maintenance of way for the Boston & Maine Railroad. F. A. Merrill formerly held this position.

J. F. McLaughlin is now superintendent of lighting and power of the El Paso (Tex.) Electric Railway, the position formerly held by Prentice M. Hatch.

R. E. Bowen is now associated with the Galveston (Tex.) Electric Company as purchasing agent. F. V. Schneider formerly had charge of this work.

F. C. Coley is now general passenger agent of the Providence, Warren & Bristol Railroad, Providence, R. I. A. B. Smith was heretofore general freight and passenger agent.

A. M. Lynn, of Pittsburgh, Pa., has been elected president of the Steubenville, Wellsburg & Weirton Railway, Wellsburg, W. Va. He succeeds R. B. Keating, who is now vice-president.

F. A. Bryan is now vice-president, instead of Henning Chambers, of the Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich. C. B. Calvert is secretary, filling the place formerly held by L. W. Botts.

C. B. Luscombe is now associated with the Western Light & Power Company, Boulder, Colo., as assistant general manager. Paul Lee is second vice-president. Paul R. Jones formerly held this post.

F. W. Walker has been elected a vice-president of the Milwaukee Northern Railway, Cedarburg, Wis. He continues his duties as general manager and chief engineer, which he has carried for some time. F. V. Benz now holds the position of purchasing agent, formerly held by Otto Maske, and more recently by A. Walker.

Joseph G. Gahm is associated with the Columbus (Ga.) Electric Company as student engineer. Mr. Gahm is connected with Stone & Webster, which controls the Columbus Electric Company. This company owns the Columbus Railroad, the Gas Light Company of Columbus and controls the Columbus Power Company.

Tudor W. Jones Acting Auditor

The appointment of Tudor W. Jones as acting auditor of the Union Traction Company of Indiana, Anderson, Ind., has been announced. The appointment was effective Aug. 15. Mr. Jones succeeds Walter Shroyer, who is now treasurer in place of W. H. Forse, who resigned.

Mr. Jones has been chief clerk in the accounting department. He knows the ways of the work, for since joining the company in 1905 he has held every position in the department. His experience also includes that as ticket agent at the Anderson station. This work he did from September, 1905, until March, 1906, when he was first affiliated with the accounting department. Since then his life has been a succession of promotions.

T. W. JONES

N. A. Sinclair Elected President

Changes in the personnel of the Cape Fear Railways, Raleigh, N. C., have been made recently. N. A. Sinclair of Fayetteville has been elected president to succeed H. L. Jones, of Norfolk, Va. He has assumed the duties of general manager in addition. L. H. Couch becomes vice-president and Alan Turner, secretary and treasurer. G. M. Wislar is in charge as superintendent. W. L. Jones was previously general manager.

Henry Sherman has been appointed chief engineer of the Tide Water Power Company, Wilmington, N. C.

W. C. Slade is superintendent of power and lines of the United Electric Railways, Providence, R. I.

E. W. Hodges is now auditor of the Pacific Gas & Electric Company, Sacramento, Cal.

George C. Wright is traffic manager of the Minneapolis, Northfield & Southern Railway, Minneapolis, Minn.

W. A. Baehr has been elected president of the St. Cloud (Minn.) Public Service Company, to succeed A. G. Whitney.

E. E. Sullivan is purchasing agent of the Marshall (Tex.) Traction Company, a position formerly held by J. E. Meadors. J. C. Kennedy is general manager.

J. C. Martin was recently elected president of the Fort Scott & Nevada Light, Heat, Water & Power Company, Nevada, Mo. He succeeds W. C. Gunn.

S. Murroy holds the position of chief engineer of the Yakima (Wash.) Valley Transportation Company. E. F. Kidder formerly was chief engineer for the company.

S. Fox is superintendent of power and H. W. S. Kelly is engineer of overhead construction of the Cleveland, Alliance & Mahoning Valley Railroad, Ravenna, Ohio.

Obituary

Charles F. Franklin died at his home at Toledo, Ohio, on Sept. 18 after an illness of several weeks, at the age of sixty-three years. He had been retired from active business about five years. Mr. Franklin's first traction affiliation was with the Newburgh (N. Y.) Electric Railway (now the Orange County Traction Company), with which he served as superintendent from 1895 to 1899. He early saw the possibilities in handling freight by electricity and introduced the system on that property. Mr. Franklin later was superintendent of the Winona Interurban Railway, Warsaw, Ind., and president and general manager of the Toledo & Western Railroad, Sylvania, Ohio. The latter property was one of the pioneers in going into the freight business on a steam road basis, and through Mr. Franklin's influence and efforts many producers were induced to locate on the line, especially in towns not served by steam railways. Mr. Franklin is survived by his wife and five children.

R. L. Waddill, a director of the Texas Electric Railway, died at his home in McKinney following an operation. Mr. Waddill was interested in financing and building the interurban line promoted by the late Col. J. F. Strickland. He had been a member of the directorate since the line was built.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE
MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Large Steel Rail Orders Reported

Almost record tonnage orders for steel rails have been reported since the announcement by the Steel Corporation of an advance in price of rails to $43 on Oct. 1. Among the orders so far placed are said to be some sizeable ones for electric railways, but such business is of course a very, very small part of the total rail business of the country. So far as the steam railroads are concerned the orders actually placed were generally expected to exceed 300,000 tons by Oct. 1, when the advance in price becomes effective. At least one other large roller of rails has announced an advance to meet the increase by the Steel Corporation.

It is, of course, impossible to estimate with any real degree of accuracy the added cost to the electric railways during the next year of the advance in the price of rails, but the rail bill of the electric railways for the coming year will probably be up another $750,000 over the sum for the last year. This figure looks puny when compared with the levy of additional cost that will be exacted from the steam railroads, but to some electric railways the extra cost, while it may not be a great burden, will be quite a serious factor.

In 1921 there was nothing like the disposition among electric railways to go ahead with new and reconstruction work that has been manifested this year, but even last year 150 miles of new track were built in the form of extensions and 615 miles of track were rebuilt. The track rebuilt last year was only a little more than 1 per cent of the total mileage of the country, but the prospects early in this year were that the sum spent for rehabilitation and renewal work, to say nothing of extensions, would greatly exceed the total so spent for the last year.

Electrification of Mexican Road Proposed

Information has been received at Orizaba, Mexico, that at the recent annual meeting of the shareholders of the Mexican (Vera Cruz) Railway, held in London, England, provision was made for electrifying the 30 miles of mountain division of the road between Orizaba and Esperanza. The announcement of the proposed improvement came from Vincent W. Yorke, London, chairman of the board of directors. The electric power for operating trains on this portion of the line will be obtained either from the hydro-electric plant of Lord Cowdray and associates situated near Orizaba or an entirely separate plant will be built by the railroad, it is stated.

Mr. Yorke further said that at the shareholders' meeting the action of the Mexican Railway in obtaining a concession for a proposed railroad to run from a point on its Mexico City-Vera Cruz main line to Tampico was ratified and that financial provision for the early construction of this new line has been made. He announced that the cost of its construction would be approximately $8,000,000 United States currency. Both of these projects are to be carried out whether or not the administration of President Alvaro Obregon is recognized by England.

Plans for Louisville Improvements to Be Announced Soon

The Louisville (Ky.) Railway at meetings within the next few days will decide on just what expenditures the company will make in improvements to its power plants, and also what purchases of new cars and equipment will be made. The company has a considerable fund for improvements, held out from the difference between a 5- and 7-cent fare during some nineteen months that the higher fare was in the courts. It is planned to improve the power plant materially and to put on a number of one-man cars. Sam Riddle, vice-president of the company, stated that a definite plan for improvement of equipment, etc., would probably be ready for announcement within a week.

Reasons Given for Decline in Latin-American Trade

The decline in the trade of the United States with Latin America during 1921 is explained by the Bureau of Foreign and Domestic Commerce as being due to a number of factors, chief among which might be mentioned the highly inflated prices in 1920, which gave the impression that the volume of trade, compared with previous years, was larger than was actually the case; the overstocked markets, which were a result of the feverish buying in 1919 and 1920; the steady deflation in prices, which caused merchants generally to keep orders down to a minimum in the expectation of still lower prices; and the appreciation of the American dollar.

Some competition was encountered from other countries trading in the Latin-American field, but aside from the general depression experienced in all of these countries, the greatest obstacle to our trade was the high quotation of the dollar, which tended to throw trade to European countries, whose currency was in most cases greatly depreciated. The details of the United States trade with Latin America are given in the departments' *Trade and Economic Review* for 1921, No. 9.

Record Coal Loadings Reported

A total of 195,142 cars were loaded with coal during the week which ended on Sept. 16, according to reports just received from the railroads by the Association of Railway Executives.

Of this total, 175,326 cars were loaded with bituminous coal, an increase of 17,316 cars over the week before, when, however, there was a falling off in coal loadings due to the observance of Labor Day. The remaining 19,816 cars were loaded with anthracite coal during the past week, which was the first week of production since the recent agreement was reached between anthracite operators and miners.

On the basis of these loadings, coal production during the week ended Sept. 16 approximated 10,633,000 tons, of which 9,650,000 tons consisted of bituminous coal and 983,000 tons were anthracite coal.

A total of 5,088 cars were loaded with anthracite coal on Sept. 16, the largest number for any one day since operations were resumed in the anthracite fields, and 384 cars in excess of the preceding day. This was within 363 cars of the average daily loading in September last year.

Loading of bituminous coal on Saturday amounted to 25,073 cars, 2,798 cars below the preceding day. Coal loadings in the bituminous fields, however, always show a decrease on Saturday compared with other days in the week.

Easterners Negotiating for Barney & Smith Plant

It is said to be probable that the Barney & Smith Car Company's plant at Dayton, Ohio, will be sold to Robert J. McGare, New York. Mr. McGare was in Dayton on Sept. 14 to confer with Valentine Winters, president of the Winters National Bank and receiver of the car company. It was explained that all of the necessary machinery to resume car building is installed in the Dayton plant, one of the largest in the country.

Tenders Out for Bombay Electrification

It is reported that tenders have been asked in London for the electrification of the Bombay Suburban Railways. It is understood that the total expenditure will probably approximate £2,000,000.

Metal, Coal and Material Prices

Metals—New York	Sept. 19, 1922
Copper, electrolytic, cents per lb.	14.00
Copper wire base, cents per lb.	15.625
Lead, cents per lb.	6.10
Zinc, cents per lb.	7.00
Tin, Straits, cents per lb.	32.125
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$8.075
Somerset mine run, Boston, net tons	4.875
Pittsburgh mine run, Pittsburgh, net tons	4.625
Franklin, Ill., screenings, Chicago, net tons	4.425
Central, Ill., screenings, Chicago, net tons	3.625
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., cents per lb.	6.00
Weatherproof wire base, N.Y., cents per lb.	16.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N.Y., cents per gal.	91.50
White lead, (100-lb. keg), N.Y., cents per lb.	12.50
Turpentine, (bbl. lots), N.Y., per gal.	$1.32

Rolling Stock

New Brunswick Power Company, St. John, N. B., has converted all its open cars into closed cars, thereby eliminating the necessity of purchasing additional rolling stock.

Wisconsin Public Service Company, Green Bay, Wis., will spend approximately $10,700 on the new one-man interurban cars which will replace the two-man cars now in operation. This improvement has been referred to previously in these columns.

Municipal Railway, San Francisco, Calif.—Contracts have been awarded by the city and county of San Francisco for twenty car bodies and their equipment. The bodies will be built by the Bethlehem Shipbuilding Company, Twentieth and Illinois Streets, San Francisco, at $152,520, the trucks will be supplied by the Standard Motor Truck Company at $28,551, the motors by the Westinghouse Company at $119,777 and the airbrake equipment by the Westinghouse Traction Brake Company at $11,008.

Washington Railway & Electric Company, Washington, D. C., has placed an order with the J. G. Brill Company for ten 28-ft. 5-in. closed motor car bodies. These cars will be equipped with automatic safety devices and are intended for one-man operation. The cars are different from the standard Birney cars, particularly in that they are to be mounted on maximum traction trucks with G. E. 257 motors and will have monitor deck roofs. The construction will be composite in that the underframe will be of steel and the frame of the superstructure of wood.

Track and Roadway

Wisconsin Public Service Company, Green Bay, Wis., has extended its line 2 miles to the West Walnut Street line.

Savannah Electric & Power Company, Savannah, Ga., has recently installed a new curve in the track at West Boundry and York Streets.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has been granted a franchise to construct either a single or double track line on the Port Washington Road to Lincoln Park.

Gloucester, N. J.—The board of directors of the Gloucester, N. J., Chamber of Commerce has discussed a proposed belt line from one end of the city to the other. A survey will be made by an engineer to determine just where the line can best be run to connect with all manufacturing plants.

Ohio Valley Electric Railway, Huntington, W. Va., will make a big improvement in service on the Twelfth Avenue line by the installation of a switch between Eighth and Ninth Streets. Work on the switch which has been started may delay the service temporarily. The company's Sixth Avenue line is undergoing repairs.

Georgia Railway & Power Company, Atlanta, Ga., announced some time ago that it would begin immediately the repair work between the car tracks in Lee Street from Park Street to McCall's Crossing. F. L. Butler, general manager of the company, said that it was the purpose of the company to lay new rails between Park Street and Gordon Street.

Kansas - Oklahoma.—The proposed construction of an interurban railway which will link the Kansas coal fields with the lead and zinc deposits of northeastern Oklahoma has been announced by J. J. Heim, president of the Joplin & Pittsburgh Railroad. It is proposed to extend the line from Columbus, Kan., to Picher, Okla., a distance of 11 miles. The Chamber of Commerce at Columbus, Kan., has been asked to issue bonds of $20.000 to aid in securing the extension into Oklahoma.

Seattle, Wash.—A. E. Pierce, Construction Engineer of the Seattle Municipal Railways Department, announces that railway construction and maintenance work now proceeding in the city will total a cost of $1,250,000. The largest of the present undertakings is the retracking of First Avenue and First Avenue South, estimated to cost $250,000. Next year's renewal and reconstruction work is to cost approximately $824,460.

Kansas City (Mo.) Railways during the past few months has completed two track rehabilitation jobs. The first of these was the reconstruction of Eighth Street from Wyandotte to Broadway. This work, completed about Aug. 5, cost in the neighborhood of $14,000. The reconstruction of Grand Avenue from Twelfth Street to Fifteenth Street was begun on Aug. 1 and is to be completed this month at an approximate cost of $35,000. These improvement plans were referred to in the issue of July 22.

Power Houses, Shops and Buildings

The Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., has started work on its new terminal on Oak Street, Leamington.

Eastern Wisconsin Electric Company, Sheboygan, Wis., will spend $50,000 for the erection of a new carhouse and repair plant in Oshkosh to replace buildings burned in June.

United Electric Railways, Providence, R. I., has received permission from the town of East Providence to erect a large carhouse of brick on North Broadway, near Massasoit Avenue. It is planned to start construction in a few weeks and to have the structure completed by Jan. 1, 1923.

Boston (Mass.) Elevated Railway has awarded the contract to the Simpson Brothers Corporation, Boston, for the substructures and foundation work in connection with the construction of two 160 x 300-ft. and two 53 x 56-ft. car repair shops and a 80 x 731-ft. transfer yard, etc., to cost $3,000,000, at Everett, Mass. Dwight P. Robinson & Company, New York, are the engineers.

Salt Lake City, Utah.—Actual construction of the passenger depot of the Salt Lake Terminal Company at the southwest corner of West Temple and South Temple Streets will commence as soon as the necessary changes can be made in the drawings and contracts for the work let. The structure will cost approximately $200,000. This announcement has been made by W. C. Orem, president and general manager of the Salt Lake & Utah Railroad, which company, together with the Bamberger Electric railroad, forms the Terminal company. Sale of certain bonds upon which work on the building has been pending has resulted in the above announcement. Construction work is expected to be completed not later than next spring.

Trade Notes

National Railway Appliance Company, New York, N. Y., has moved its offices from 452 Lexington Avenue, corner of Forty-fifth Street, to the Transit Building, 7 East Forty-second Street.

The Ward Leonard Electric Company, Mount Vernon, N. Y., announces the appointment of Willis D. Bishop of Montreal, Quebec, as selling representative in the Province of Quebec. He has been closely identified with the design, application and sale of control apparatus and switchboards since 1904, and is therefore well qualified to represent the Ward Leonard line of electrical control apparatus.

Louisville Frog & Switch Company, Louisville, Ky., announces that F. W. Carter, formerly assistant manager of the heavy traction division of the Westinghouse Electric & Manufacturing Company, has now become president of the Louisville company. Mr. Carter was connected with the New York office of the Westinghouse company for four years doing heavy traction work.

Westinghouse Traction Brake Company announces that G. B. Pierce of St. Paul, Minn., has been appointed air brake engineer for the Far East and will sail for Japan in September to establish headquarters in Tokyo with W. G. Kaylor, manager of the Westinghouse Traction Brake and Westinghouse Air Brake interests in the Orient. Mr. Pierce will also represent the Westinghouse Air Brake Company. He will collaborate with Mr. Kaylor in a territory covering Japan, China, Manchuria and Korea. Mr. Pierce has been with the Westinghouse Air Brake Company as a mechanical expert in St. Paul for twelve years. He was formerly a locomotive engineer and acting road foreman of engines on the Montana division of the Northern Pacific Railroad. One of Mr. Pierce's chief duties in the Orient will be that of instructing railway employees in the operation and maintenance of Westinghouse brake equipment.

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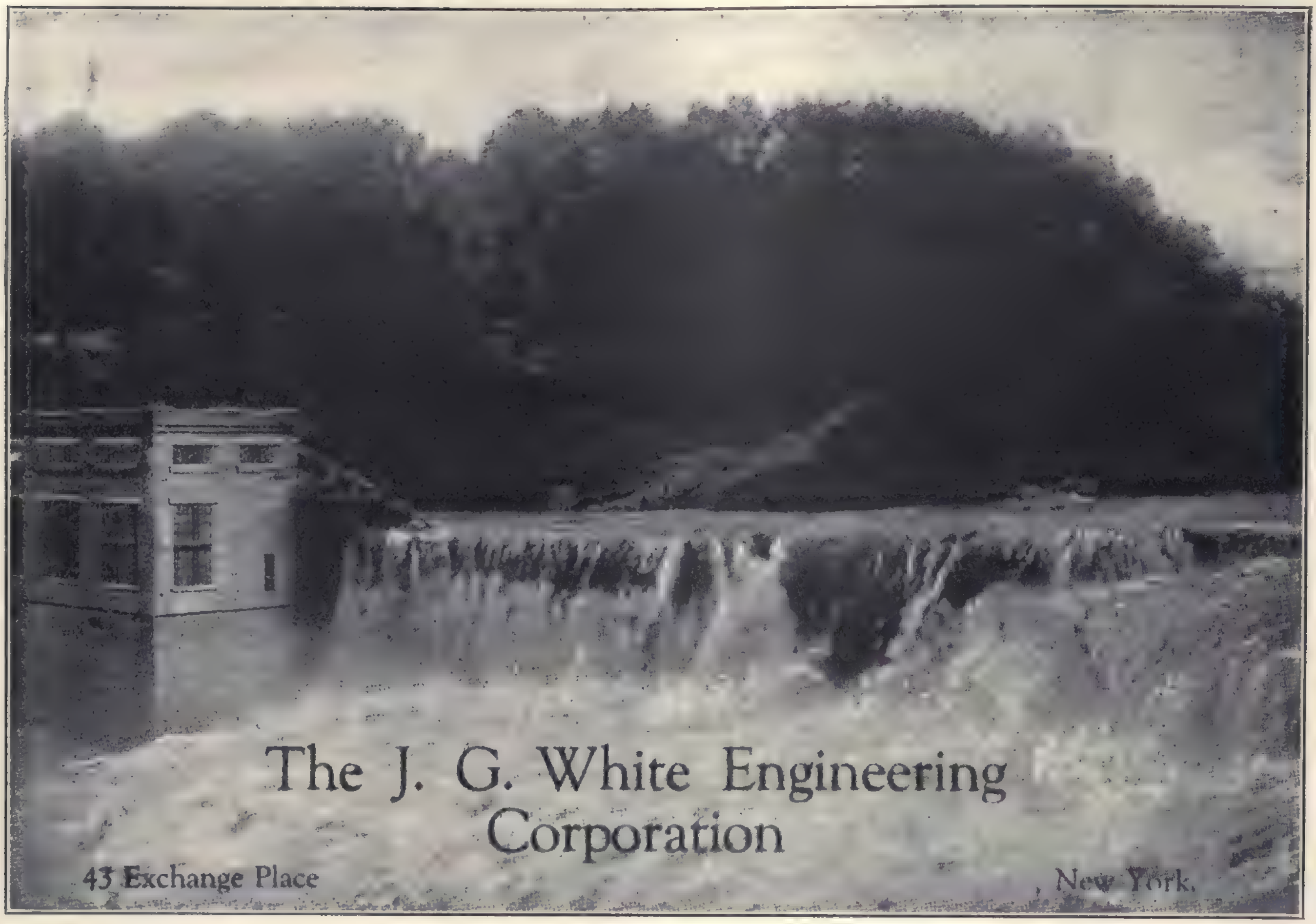

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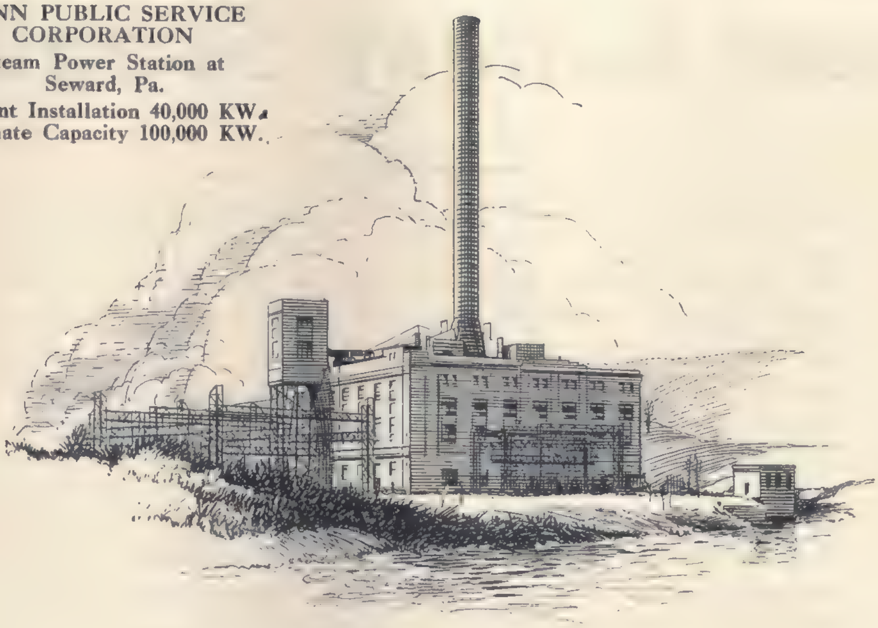

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The general level of commodity prices and wages rose steadily from 1896 to 1920, greatly accelerated by the outbreak of the War in 1914 and by the participation of the United States in 1917. In general, increasing operating expenses had largely offset gains in the gross earnings of street railways by 1912, and the five-year period 1915-1920 was one of unusual hardship to many traction properties, so that there has been a strong prejudice against their securities in recent years.

After careful analysis we believe that these difficulties have been overcome with respect to the street railway situation as a whole throughout the United States, and that the outlook is decidedly favorable for well-managed and conservatively capitalized companies. We believe that within two or three years the investment securities of such companies will have regained much of their former standing.

We have prepared an analysis of the present conditions in the Street Railway Industry which we will gladly send upon request.

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PHILADELPHIA

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK
Street Railway Inspection DETECTIVES
131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Personal Attention

Despite the growth of our business, it has remained our fixed policy to give the utmost personal attention to every individual account. Any of our officers will be glad, upon request, to tell or write you about our Service as applied to your business.

Correspondence Solicited
Out-of-town Accounts Invited

Resources: Over $23,000,000

The Coal & Iron
National Bank
of the City of New York
Cor. Liberty and West Sts.
Member New York Clearing House Association

SEARCHLIGHT SECTION

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 5 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 14 inches	4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS WANTED

ELECTRICAL and mechanical engineer, 34 years, married, with ten years' technical and commercial experience with largest electrical manufacturers, seeks opportunity for service. Technical experience covers design electric, industrial and power machinery, railway motors, control apparatus, equipment, and their application. Commercial experience includes correspondence and some selling. Preferred is a position as assistant to consulting engineer, as sales or as executive engineer. PW-464, Elec. Ry. Journal.

WORKING barn foreman desires position. Can do any kind of wiring, wind armatures and controller repairs; 12 years' experience. PW-463, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

FOR SALE

12 New General Electric 203-P

MOTORS

TRANSIT EQUIPMENT CO.
501 Fifth Ave., New York

FOR SALE

2 SNOW SWEEPERS

On McGuire Truck, 50-hp. motors, double end K-35 G. E. Control. Very low price. Immed ate delivery.

ELECTRIC EQUIPMENT COMPANY,
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

58 Johnson Fare Boxes

Handles Pennies, Nickels Dimes. In A-1 condition. Make us an offer.

East St. Louis Railway Co.
East St. Louis, Illinois

FOR SALE

20—Peter Witt Cars.
Located Cleveland

8—Interurban Combination.
Located Lima, Ohio

3—Freight-Express Cars.
Located Cincinnati

All Complete—Immediate Delivery

Electric Equipment Co.
Commonwealth Bldg., Philadelphia, Pa.

H. M. FOSTER CO.
Continental Building, Baltimore, Md.

Buyers and Dismantlers of Street Railway Properties

Relaying Rail, all weights, Bought and Sold

The "Searchlight" Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are *you* using the Searchlight Section?

0318

SPECIAL NOTICE

Please be
advised that

HYMAN-MICHAELS COMPANY
531 Peoples Gas Building, CHICAGO

With Offices at

NEW YORK CITY
PITTSBURGH
ST. LOUIS
DETROIT
SAN FRANCISCO
McKEES ROCK, PA.
EAST CHICAGO, IND.

are reliable factors in the
Buying of Electric Street Car and Interurban Lines
for dismantling—including all appurtenances.

***Communicate with them when you are ready
to Buy or Sell***

Get Their Quotations

Dependable Service

**Also large tonnages of No. 1 Relaying Rails and Angle Bars
in all weights *for sale* ready for Immediate Shipment**

There are Extensive Stocks of Machine Tools and Shop Supplies at These

TWO AUCTION SALES

At Camp Knox, Ky.,
October 5th

Purchased for the U.S. Army
MACHINERY

At Camp Grant, Ill.,
October 10th

Among the machine tool items you will be interested in are:—Power Hack Saw Blades, Wood Working Benches, Chucks, drill and lathe, Counterbores and countersinks, assorted. Taps and Dies, various. Reed 20 in. Engine Lathes. LeBlond Engine Lathes. Reed-Prentice extra heavy duty Boring Lathes. Woodward and Powell Planers. Pulleys, wood, steel, and paper. Fairbanks-Morse Portable Platform Scales. Grinding Wheels, Alundum and Aloxite, assorted. Machine Lathes various.

Prospective purchasers should visit Camp Knox before date of sale and inspect this equipment.

Catalog and all information concerning this sale may be obtained by writing to the address below.

The following are suggestions as to what industrial buyers and store-keepers can find among the items to be auctioned off at Camp Grant:

Wiring Fixtures, box lots. Switchboard and accessories, box lots. Bar Iron. Blocks, iron. Bolts, carriage and machine. Boilers, Kewanee and Erie, 150-lb. pressure. Bushings, iron and steel. Couplings, cast iron, assorted. Elbows, Ells and Tees, cast iron. Gauges, steam pressure. Hangers, cast iron, pipe and shaft. Magnetos, various. Nipples, steel, various. Packing, hydraulic and steam. Pipe, wrought iron and cast iron. Pipe Fittings. Radiators, steam, various. Rivets, assorted. Valves, various. Wrenches, various. Plumbing Supplies, box lots.

Send for catalog and information concerning this sale, and arrange to inspect this material.

Q. M. Supply Officer

1819 W. Pershing Road, Chicago, Ill.

The Government reserves the right to reject any or all bids.

WAR DEPARTMENT

AUCTION

There is a wealth of Electrical Equipment in the Erie Howitzer Plant

The electrical equipment and supplies to be sold at public auction October 4th, 5th and 6th, are too vast to be enumerated. Suffice it to say that users of electrical equipment, machine tools and power plant accessories will find it to their advantage to send inspectors to this plant and make arrangements for being present on the sale dates. The following list nowhere near covers the material which will interest electrical engineers and mechanics, and it is published solely for the purpose of suggesting a few of the more prominent items to be found in a list six or seven times more extensive.

60	Motors, various, all well-known makes.
50	Circuit Breakers, Oil, G-E.
2,000	Switches, all types.
5,600	Sets Coils, motor, various types and sizes.
2	Cutler-Hammer Paneled Switchboards.
310	Ft. Trolley Rail and Hangers.
3	Kuhlman Transformers.
75	Motor Starters and Controllers.

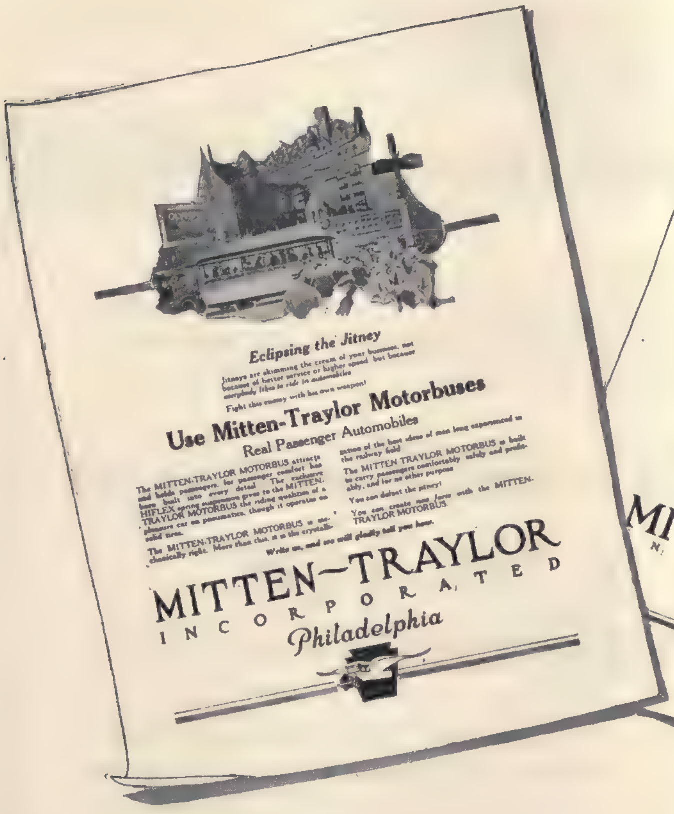
Send your inspectors to Erie, Pa., at once, and be ready to give your figure when this equipment is auctioned off October 4th, 5th and 6th, at the Erie Howitzer Plant.

For catalog and complete information concerning this sale, write to the

Commanding Officer
Frankford Arsenal, Philadelphia, Pa.

The Government reserves the right to reject any or all bids.

WAR DEPARTMENT



Eclipsing the Jitney

Jitneys are skimming the cream of your business, not because of better service or higher speed but because everybody likes to ride in automobiles

Fight this enemy with his own weapon!

Use Mitten-Traylor Motorbuses

Real Passenger Automobiles

The MITTEN-TRAYLOR MOTORBUS attracts and holds passengers, for passenger comfort has been built into every detail. The exclusive HIFLEX spring suspension gives to the MITTEN-TRAYLOR MOTORBUS the riding qualities of a pleasure car on pneumatics, though it operates on solid tires.

The MITTEN-TRAYLOR MOTORBUS is mechanically right. More than this, it is the crystallization of the best ideas of men long experienced in the railway field.

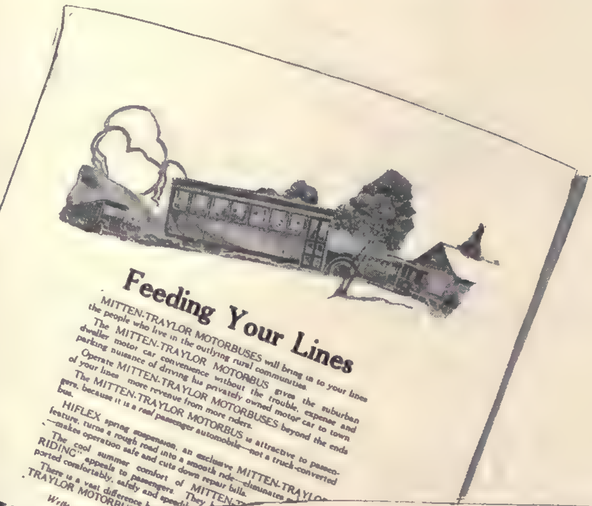
The MITTEN-TRAYLOR MOTORBUS is built to carry passengers comfortably, safely and profitably, and for no other purpose.

You can defeat the jitney!

You can create new fares with the MITTEN-TRAYLOR MOTORBUS.

Write us, and we will gladly tell you how.

MITTEN–TRAYLOR
INCORPORATED
Philadelphia



Feeding Your Lines

MITTEN-TRAYLOR MOTORBUSES will bring in to your lines the people who live in the outlying rural communities.

The MITTEN-TRAYLOR MOTORBUS gives the suburban dweller motor car convenience without the trouble, expense and parking nuisance of driving his privately owned motor car to town.

Operate MITTEN-TRAYLOR MOTORBUSES beyond the ends of your lines — more revenue from more riders.

The MITTEN-TRAYLOR MOTORBUS is attractive to passengers, because it is a *real passenger automobile*—not a truck-converted bus.

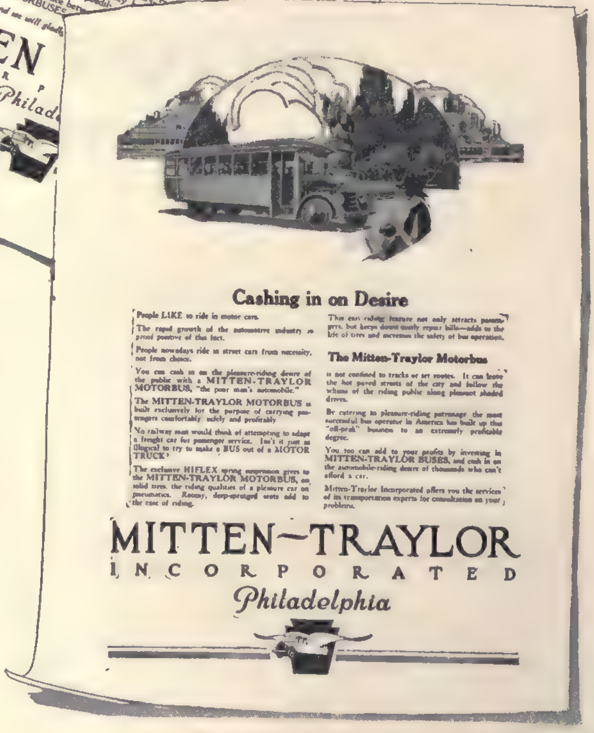
HIFLEX spring suspension, an exclusive MITTEN-TRAYLO
feature, turns a rough road into a smooth ride—eliminates
—makes operation safe and cuts down repair bills.

The cool summer comfort of MITTEN-T
RIDING" appeals to passengers. They
ported comfortably, safely and speedil

There is a vast difference bet
TRAYLOR MOTORBUSES

Write and we will gladly

MITTEN
C O R P
Philad



Cashing in on Desire

People LIKE to ride in motor cars.

The rapid growth of the automotive industry is proof positive of that fact.

People nowadays ride in street cars from necessity, not from choice.

You can cash in on the pleasure-riding desire of the public with a MITTEN-TRAYLOR MOTORBUS, "the poor man's automobile."

The MITTEN-TRAYLOR MOTORBUS is built exclusively for the purpose of carrying passengers comfortably, safely and profitably.

No railway man would think of attempting to adapt a freight car for passenger service. Isn't it just as illogical to try to make a BUS out of a MOTOR TRUCK?

The exclusive HIFLEX spring suspension gives to the MITTEN-TRAYLOR MOTORBUS, on solid tires, the riding qualities of a pleasure car on pneumatics. Roomy, deep-springed seats add to the ease of riding.

This easy-riding feature not only attracts passengers, but keeps down costly repair bills—adds to the life of tires and increases the safety of bus operation.

The Mitten-Traylor Motorbus

is not confined to tracks or set routes. It can leave the hot paved streets of the city and follow the whims of the riding public along pleasant shaded drives.

By catering to pleasure-riding patronage the most successful bus operator in America has built up this "off-peak" business to an extremely profitable degree.

You too can add to your profits by investing in MITTEN-TRAYLOR BUSES, and cash in on the automobile-riding desire of thousands who can't afford a car.

Mitten-Traylor Incorporated offers you the services of its transportation experts for consultation on your problems.

MITTEN–TRAYLOR
INCORPORATED
Philadelphia

A Necessity

Almost every electric railway man will admit the usefulness and necessity of operating buses in conjunction with existing trolley lines.

Above are reproduced a few of the functions which may be fulfilled by buses working in harmony with trolleys. We will be glad to send you reprints of any of these suggestions you may desire to study more closely.

MITTEN
TRAYLOR

MITTEN–
INCORP
Philadelphia

Built for You

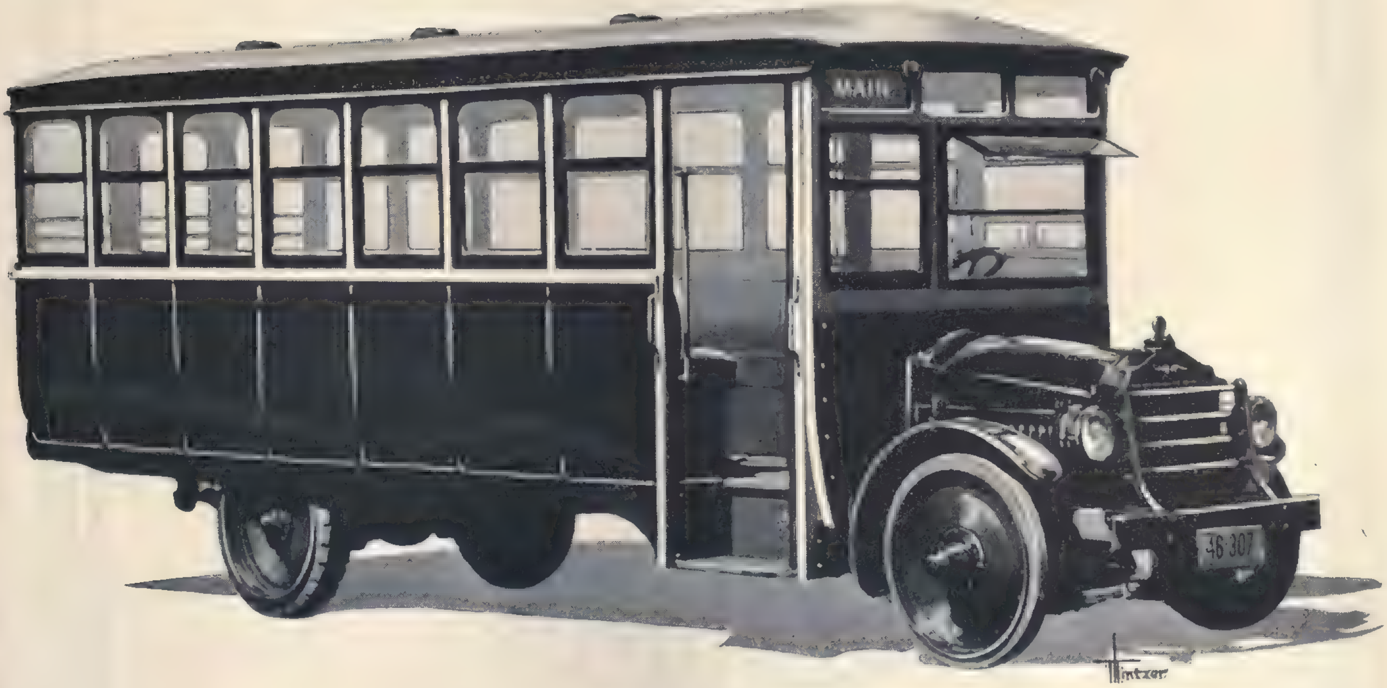
MITTEN-TRAYLOR MOTORBUSES were designed and are built by men who have made passenger transportation their life work.

MITTEN-TRAYLOR MOTORBUSES carry passengers comfortably, safely and profitably because they are built for that purpose.

No detail has been overlooked to make MITTEN-TRAYLOR the REAL passenger carrying automobile that it is.

You will be interested in our descriptive bulletin.

Write for it now.



TRAYLOR
ORATED
Pennsylvania

MITTEN
TRAYLOR

REPUBLIC
KNIGHT-MOTORED BUS

The success achieved by our Public Utilities Division in solving feeder service problems confronting Electric Railways will be evidenced in the Republic Knight-Motored Bus exhibit at the A.E.R.A. Convention, in Chicago, October 2-6, 1922.

(*Booths 31 to 38 inclusive*)

REPUBLIC TRUCK SALES CORPORATION
ALMA, MICHIGAN

REPUBLIC

Transportation is a natural monopoly subject to regulation

Readjustment Problems

The Federal Electric Railways Commission established the principles that **the Electric Railways must expand—the first essential is to restore their credit—the industry must introduce economies in operation and improve the equipment and service to assure a reasonable return on the fair value of the property.**

A. L. Drum & Company
Consulting and Constructing Engineers

HAVE designed, constructed and placed in operation over 450 miles of electric Railway.

Have been Consulting Engineers on operation and construction for 3500 miles of Electric Railway, including Chicago, Philadelphia, Cincinnati, Minneapolis and Saint Paul.

Have made Inventories and Valuations of Electric Railways aggregating a total of $2,000,000,000, including Surface, Subway and Elevated Lines.

Have prepared Subway and Elevated Plans for Chicago, Philadelphia and Cincinnati.

Have made Engineering and Financial Investigations and reports on the Motor Bus operations in New York, Chicago, London and Paris.

Have rerouted the Surface Car Systems in Philadelphia and in Baltimore, resulting in improved service and economies in operation with large increases in the rush hour track capacity of the Business District of both cities.

Have participated in the negotiations for contracts and service at cost franchises in the cities of Cincinnati, Philadelphia, Chicago, Milwaukee (Interurban), Dayton and Minneapolis.

Have made accounting, operating and engineering investigations and analyses of many of the electric railway companies in the United States for the issuance of securities and for rate studies for presentation to Public Service Commissions.

Have made and presented to the Toronto Arbitration Board valuations of the property of the Toronto Railway Company and are now assisting the Company in the Arbitration Proceedings to determine the price to be paid by the City of Toronto for the Property.

The Future of Electric Railways Depends Upon the Adoption of Wise Policies During the Present Readjustment Period.

A. L. DRUM & COMPANY
Consulting and Constructing Engineers
Valuation and Financial Reports
Rate Studies for Presentation to Public Service Commissions
Construction and Management of Electric Railways

76 West Monroe Street
Chicago, Ill.

510 Penn Square Building
Philadelphia, Pa.

200,000

Perry-Hartman Bearings

are reducing Flange Wear Today!

Double the life of your wheels

Cut down pull-ins for wheel renewals 50%

Decrease Nosing

Lessen flange and rail wear

Reduce power consumption on curves

Reduce curve lubrication costs

Readily applied to old as well as new cars

Burry Railway Supply Co.

1316 Peoples Gas Building, Chicago, Ill.

SHOP AND POWER PLANT EQUIPMENT

Advertisers In This Section

Allis-Chalmers Mfg. Co.
Anchor Webbing Co.

Babcock & Wilcox Co., The
Buckeye Jack Mfg. Co.

Cameron Electrical Mfg. Co., Inc.
Columbia Machine Works & Malleable Iron Co.
Cutter Co., The

Duff Mfg. Co.

Ford Chain Block Co.

Galena-Signal Oil Co.
Gladium Co.

India Alkali Works

Irvington Varnish & Insulator Co.

McGraw-Hill Book Co.
Mica Insulator Co.

National Fibre & Insulation Co.

St. Louis Surfacer & Paint Co.
Spray Engineering Co.
Sterling Varnish Co.

Terry Steam Turbine Co.
Texas Co.
Thompson-Levering Co.

Universal Lubricating Co.

Williams & Co., J. H.

Dependable Air Brake Equipment
for
Electric Railways

Type OB4
Governor

**The culmination of over
20 years of experience.**

Type C
Engineers Valve

½-inch
Pop Safety Valve

Type AA-7B—17 Cu. Ft.
Air Compressor

Drain and
Stop Cock

Type J
Emergency Valve

Send in your specifications

**See this equipment at
American Electric Railway Association
Convention, Section B, Booth 71**

Air Gauge

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS
MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN, U.S.A.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

Less Labor in Oiling Less in Maintenance A Direct Result of Using TULC

The first cost of lubricant should not enter into consideration if the lubricant will pay for itself by saving in the life of your equipment, by cutting your shop costs and by keeping your cars out on the line.

TULC is an investment—not a purchase. Do not think of TULC as a purchase—think in terms of investment and expect your dividends in actual dollars saved on upkeep.

The **Universal Lubricating Co.**
Offices: Schofield Bldg. **Works: Sweeney Ave.**
Cleveland, Ohio

TULC
A
LUBRICANT

—scientifically and accurately compounded to reduce lubricating costs

The Galena Organization is buil

— Lubrication — — Service —

Talk to a Galena Service Man

on rolling stock lubrication practices

That's what we're for—to go into lubrication problems thoroughly with you. It's our business to show you how to get the most miles per dollar, and that doesn't necessarily mean using the oil that's cheapest per gallon. Lubrication efficiency is what you need most, and the average railway mechanical man hasn't time to become a lubrication expert.

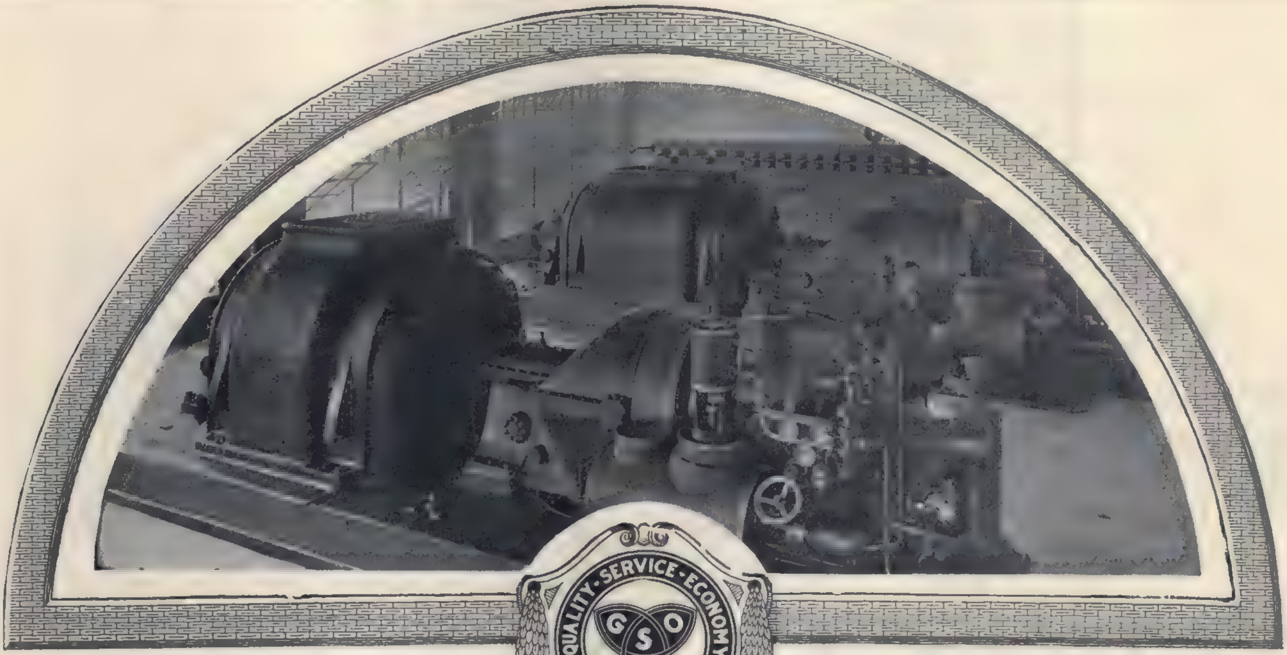
We have specialized in this field—our business is railway lubrication exclusively. That is why hundreds of electric railways have come to depend on Galena service. They know that we are interested primarily in efficient lubrication service, rather than merely in the sale of additional gallons of oil.

It is the maximum car mileage per dollar spent for lubrication that means ultimate economy. The Galena Service Man gives you the advantage of his experience in hundreds of railway car shops.

Galena Sales Representatives and service Engineers will b

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities

for Railway Lubrication Service



— Economy — — Satisfaction —

Talk to a Galena Service Man

on power plant lubrication practices

Where large power units, engines, turbines, rotary converters, motor generators and auxiliary apparatus are involved, you cannot afford to take chances on unscientific lubrication economies. These units, worth thousands of dollars each in themselves, would cost thousands more in the losses they would cause, if rendered inoperative through faulty lubrication.

That's where Galena Service comes in. The Galena Service Man tackles your problem on the ground. He comes into your plant and after studying your condition thoroughly recommends not only the proper lubricants, but the most economical methods of using them. His experience in hundreds of other plants is used to your advantage.

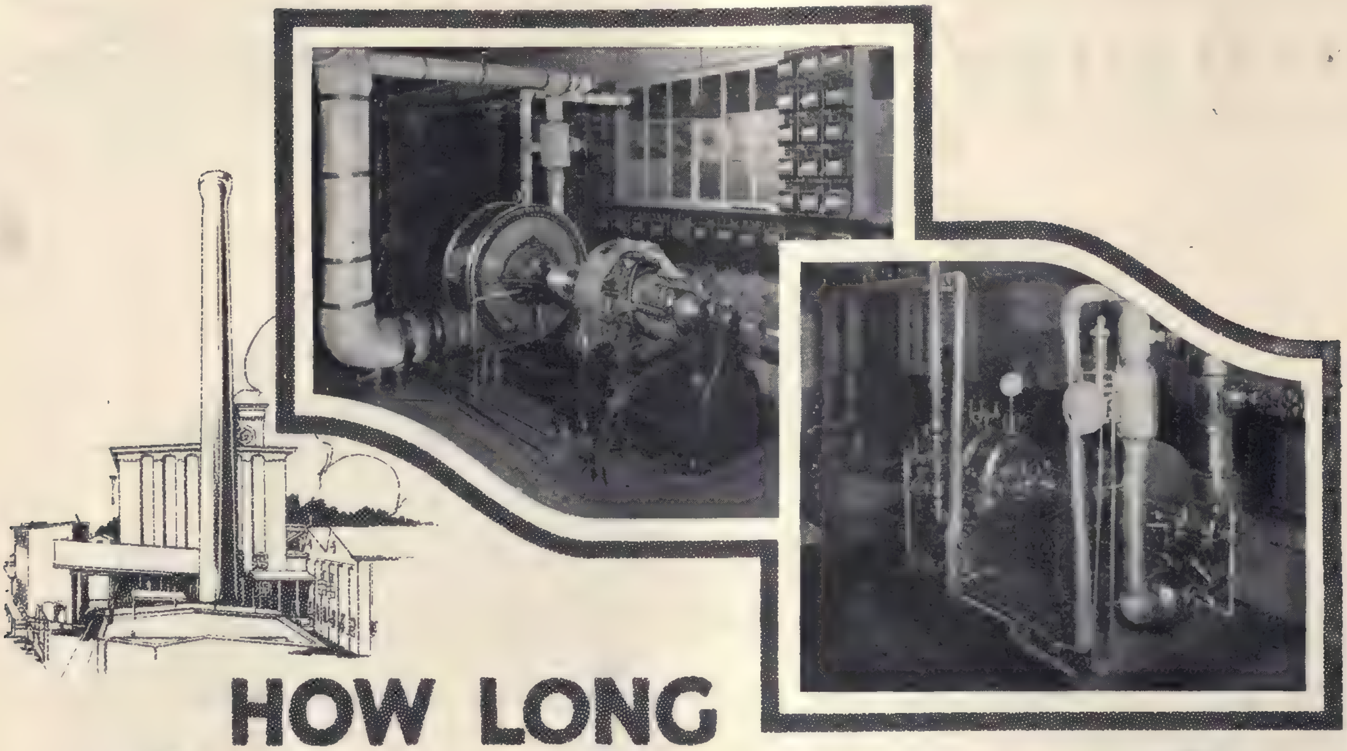
Galena railway lubricants are manufactured from purest materials of highest possible quality. They are made to produce the most **service units per dollar,** rather than to sell at the most gallons or pounds per dollar.

at our Convention Exhibit—Booth No. 1-6, Section B.

Galena-Signal Oil Company

New York • Franklin, Pa. • Chicago

and offices in principal cities



HOW LONG SHOULD A TURBINE LAST?

WHILE the life of any piece of mechanical equipment depends to a large extent on the care and attention it receives, its potential life depends upon materials and design. The illustration at the top shows a Terry Lighting Set installed in 1911 at the plant of Joseph Benn Sons, Inc. There were no shutdowns or repairs until it was overhauled in 1921 when the glands, bearings and wheel were replaced.

The Terry Boiler Feed Unit illustrated at the right was installed in 1912, a new wheel was all that was necessary when it was overhauled in 1921. By replacing these worn parts they have practically restored the turbines to their original condition. Dividing the cost of these repairs by the number of years in operation shows an exceptionally low upkeep cost per year, thus it is possible to prolong the life of the Terry Turbine indefinitely by replacing the few wearing parts. This is an important item to bear in mind when considering the first cost of your Steam Turbine.

Bulletin A-25 describes in detail the wearing parts and shows their accessible arrangement in the Turbine. Write for it and you can easily see you are making a permanent investment when you buy

T-784

THE TERRY TURBINE

Offices in Principal Cities
in U.S.A. also in Important
Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.

Keep *Up* Equipment and Property

and Keep *Down* Maintenance Costs

"SPRACO"
Pneumatic
PAINTING
EQUIPMENT

Representatives
in the Eastern and
Middle States

Baumes-McDevitt Machinery Co.
1953 Railway Exchange Bldg.
St. Louis, Missouri

Irvin C. DeHaven Engr. Company
State Life Building
Indianapolis, Indiana

Mr. Glenn S. Groves
3131 Essex Road
Cleveland Heights, Ohio

Power Equipment Company
712 Second National Bank Bldg.
Toledo, Ohio

Power Equipment Company
618 Moffat Building
Detroit, Michigan

Oscar J. West
457 Peoples Gas Building
Chicago, Illinois

A. M. Lockett & Company
533 Baronne Street
New Orleans, Louisiana

J. S. Cothran
908-909 Commercial Bank Bldg.
Charlotte, North Carolina

Baumes-McDevitt Machinery Co.
205-207 Scarritt Building
Kansas City, Missouri

The Donham-Adams Company
824 Singer Building
New York City, New York

H. A. Rapelye
816 Oliver Building
Pittsburgh, Pennsylvania

H. F. Sanville
1328 Chestnut Street
Philadelphia, Pennsylvania

Thompson-Hague
Mercantile Library Bldg.
Cincinnati, Ohio

Tennant-Lovegrove
Union National Bank Building
Houston, Texas

Do your painting with a "Spraco" Paint Gun on all car bodies—Under Rigging—Bridges—Elevated Structures—Steel Frame Buildings—Tubular Poles, etc.

One handy-man with Spraco Pneumatic Painting Equipment can outstrip five or six men with brush and pail. And he will use less paint, lay on a smoother, more uniform coating and get into cracks, crevices and corners where good hand-brush work is impossible.

Why not refinish your rolling stock by the "*Spraco*" Method as shown in the above illustration? And thus reduce your labor costs 50—80%.

There is a "Spraco" Equipment for every class of painting or finishing work.

Investigate Today!

Send for "Spraco" Bulletin No. P-71

SPRAY ENGINEERING CO.

Engineers for
Spray Cooling Systems
Irrigation Systems
Aerating Reservoirs
Air Condition
Gas Washing

60 High Street
BOSTON
MASS.

Manufacturers of
Air Washing Equipment
Spray Cooling Equipment
Paint Spraying Equipment
Flow Meters
Park Sprinklers

Why TEXACO should lubricate Your Road:

1. Texaco knows Lubricants

Witness the millions of gallons of Texaco Lubricants used every month in the various industries in the United States.

2. Texaco Understands Street Railway Requirements

Witness the hundreds of millions of car miles made yearly with Texaco Street Railway Lubricants.

3. Texaco Service is worth while

The success of Texaco Lubricants is bound up with Texaco Engineering Lubrication Service. This consists of giving to the electric railways of the United States the benefit of the experience of a staff of highly trained lubrication specialists. As a matter of fact before we take your order we shall be glad to have Texaco Lubrication Engineers make a survey of your road; after which they will indicate the right kind and the right amount of lubricant for every type of car, apparatus, power unit, sub-station equipment, etc.

4. The Texaco line is complete

There is a Texaco Lubricant for every street railway purpose, for rolling stock, power plant or shop.

Texaco can also supply all your burning oil requirements.

5. Texaco provides you with lubricants when you need them

Texaco Lubricants are stocked in over 600 Texaco warehouses in all parts of the country and are ready for shipment in any quantity—tank car, barrel or can—by water, rail or truck with Texaco promptness.

If you are in any way responsible for the efficient operation of your road, make it a point to talk to the Texaco Lubrication Engineers, who will be on hand at the big Convention. You will receive a Texaco welcome at Booths Numbers 43 and 44, Section C.

If you do not attend the Convention and want to get a line on some of the big things we are doing to assist in better operation of the Electric Street Railways of America, drop us a line.

There is a Texaco Lubricant for Every Purpose

TEXACO

THE TEXAS COMPANY
DEPT. R.J. 17 BATTERY PLACE - NEW YORK CITY
HOUSTON - CHICAGO - NEW YORK
OFFICES IN PRINCIPAL CITIES

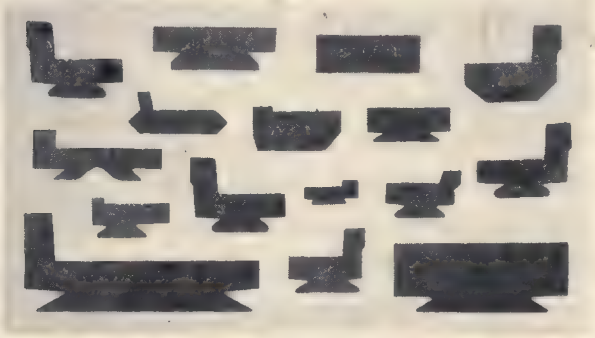
TEXACO

REAL RAILWAY INSULATION

PERFECT MICANITE INSULATOR REG. U.S. PAT. OFF.

THESE PRODUCTS PUT YOUR EQUIPMENT BACK INTO SERVICE QUICKLY, PERMANENTLY

PERFECT EMPIRE INSULATOR REG. U.S. PAT. OFF.

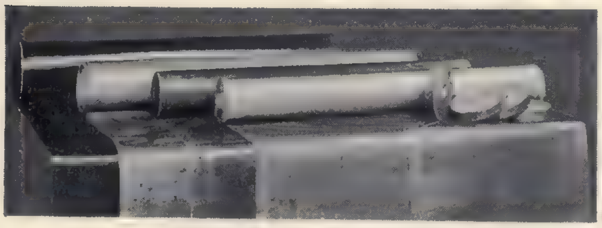


Micanite Commutator Segments

Produced from Micanite Plate containing 95 per cent selected mica film, having all the advantages of pure mica, yet in readily applied form. Provides real insulation for railway motor commutators regardless of heat, moisture or fumes. Supplied in plate form to specified thickness or to exact dimensions ready for use

Micanite Moulded Parts

Almost thirty years' service in the electrical industry is the best guarantee of this product's usefulness to the railway maintenance engineer. Made from special Micanite Moulding Plate for all sizes of commutator rings, tubes, sleeves, cones and bushings.



Empire Insulating Cloth

Fabric base coated with films of oxidized oil, providing a flexible yet firm, tough insulation. Oil and moisture proof, and extremely long in life. Has many valuable uses in car equipment repair work.

Micanite Flexible Tape

Finest India mica films, paper faced both sides. Supreme for high temperature insulation on strap- and bar-wound railway motor armatures and similar heavy duty service. Kept fresh in air-tight cans.

Armatite — 2 Insulations In 1

By combining the insulating and protective properties of Empire Cloth and fish paper in a single new product, "Armatite," the amount of time required to line and insulate armature slots and other parts is reduced one-half. The two elements, cemented under pressure, provide a flexible, easily handled, permanent, dual protection. Two insulations in one.

Gladly sent on request to any interested Railway Man: Our 40-page data book, "Electrical Insulating Materials," covering all our 55 products.

MICA INSULATOR CO.

Main Office: 68 Church Street, New York. *Chicago Office:* 542 South Dearborn Street.
Works: Schenectady, New York. Representatives in all the principal cities.

2019-F

TRADE ST·LOUIS SURFACER SPECIALTIES MARK

See St. Louis Surfacer Specialties at Booth E-66

Be sure to visit Booth E-66 at the Chicago Convention and inspect the panels and samples exhibited by the St. Louis Surfacer & Paint Co.

Four well informed representatives will be in attendance at the exhibit and will gladly give you any details concerning the numerous paint and varnish specialties offered.

Among the many well known products of the St. Louis Surfacer & Paint Co. those of special value to the Electric Railway industry are:

Surpaco Railway Varnishes—Rubbing, Finishing and Cane Seat.
Surpaco Canvas Preserver (Undercoat)
Surpaco Canvas Roof Paint (Top Coat)
St. Louis Surfacer System
Surnamel—Car Enamel System
Japan Dryers

Do not fail to call at Booth E-66—see the extensive St. Louis Surfacer exhibit.

ST. LOUIS SURFACER & PAINT CO.
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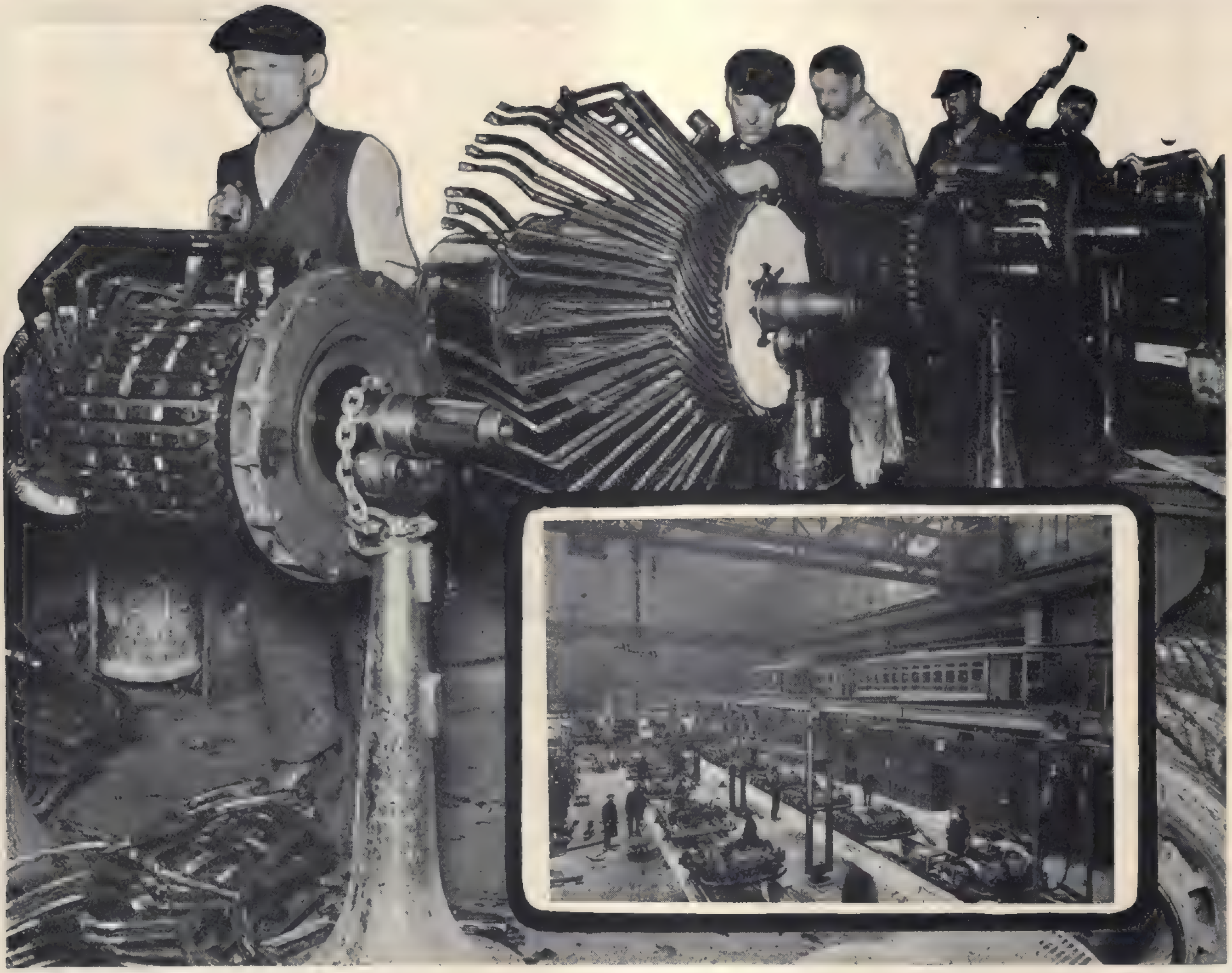

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Back to Prosperity

THE PENDULUM of prosperity in electric railway affairs is swinging upward and better times are here. Still better times are on the way. Improved net revenues and lowered operating ratios are becoming more and more general.

We, as a part of the electric railway industry, have borne our share of the burden which the past few years have laid upon us, for ninety per cent of our business is electric railway work.

We wish to express in these pages our appreciation of the opportunity to serve the industry through its past evil days and publicly to thank the roads which have made it possible for us now to serve in these days of renewed activity and hope.

We believe in the future of the electric railway industry and maintain our plant for its services.

COLUMBIA 18 92 MACHINE WORKS

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J. L. Whittaker, 141 Milk St., Boston, Mass.
E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.

All signs point to the revival of the electric railway. Among the most significant is the fact that car orders are closing at more than double last year's rate. Moreover, our own records indicate tremendously increased activity in car and overhead rejuvenation. In this work we have been privileged to help many roads. Columbia car and truck parts and Columbia line materials include many well-known specialties. Some of them are listed and illustrated on the opposite page. Yet these are but a part of the service we offer. A large part of our business is fabricating special car and truck parts and line material to specifications. With knowledge of operating requirements and shops on a production basis we can produce parts that will stand long, severe service. Moreover, we can usually produce at a saving over the cost of "home-made" parts. Quotations will check this fact.

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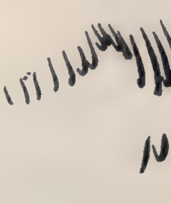

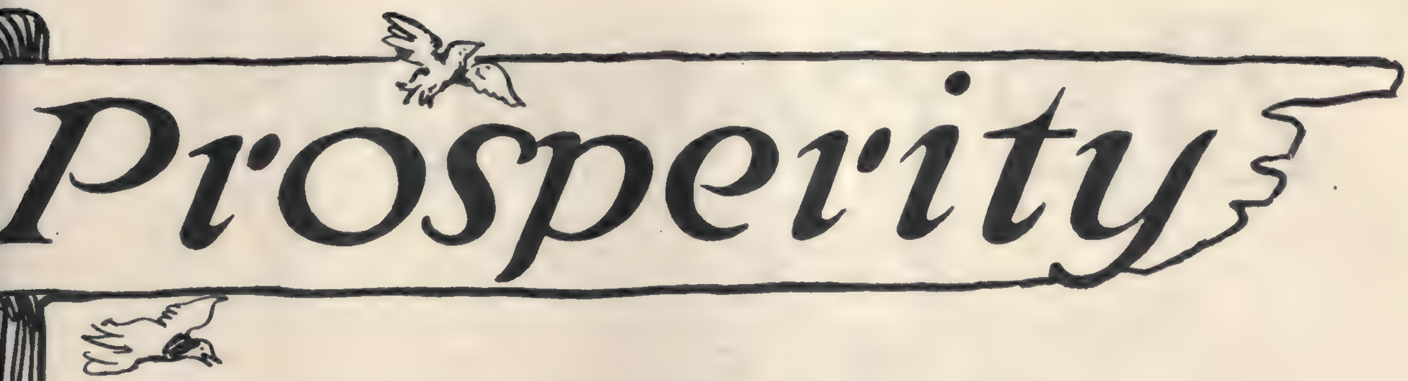

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COLUMBIA
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Especially reinforced at suspension points, these cases are almost unbreakable. Their durability and economy appeal most strongly to their many users

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- Bearings
- Brake Parts
- Car Trimmings
- Center Plates
- Commutators
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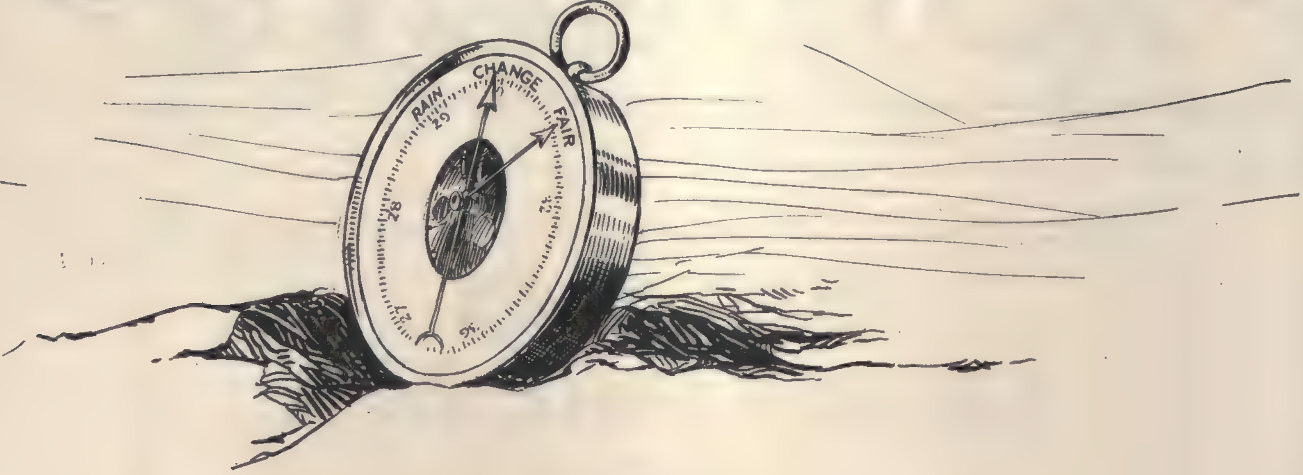
- Journal Parts
- Motor Coils
- Trolley Wheels and Harps

Columbia Line Material

- Columbia Line Material
- Trolley Ears
- Feeder Ears
- Splicing Ears

Send for latest prices

Back to



Set Fair—

When the aneroid barometer moves slowly from "storm" to "rain" to "changeable" and "fair" and finally settles at "set fair" both the amateur weather shark and the experienced mariner know that they can go confidently about their fair-weather plans. So it is today in the electric railway business. "Set Fair" is the sign of the day. Plans for rehabilitation, improvement and extension may confidently go forward. In this work, too, Columbia service fits in. The refurbishing of properties calls first of all for the means for doing the job. That means efficiently equipped repair shops.

Whether your requirements are for standard types or special machines, call on Columbia for estimates.

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and Malleable Iron Company
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Prosperity

COLUMBIA
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For many years we have been furnishing most efficient equipment and machinery for electric railway repair shops. For instance, our Columbia Car Hoist will lift a 50-ton car, 6 feet inside of 5 minutes.

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- Babbitting Moulds
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- Car Replacers
- Pinion Pullers
- Pit Jacks
- Tension Stands

Columbia
Coil Winding
Machine

Columbia Axle Straightener

Back to

The rising sun of the new day is upon the electric railway field. The industry is reawakening to new opportunities and new responsibilities. There is ample intelligence, will and enthusiasm to grasp the former and carry the latter. In making the opportunities weigh heavily and the responsibilities rest lightly, Columbia Service is perhaps at its best through its "custom service"—its ability to make to order anything for electric railway service—to make it right for the service at a right price—and, if necessary, in a hurry.

Our completely equipped shops are at *your* service. Skilled workmen and experienced engineers are here, familiar with electric railway requirements through years of closest contact.

When you are rehabilitating or converting old cars, experimenting with some new idea, or in a rush for the duplication of some old or unusual part, just get in touch with Columbia for prompt and economical work. We are equipped to serve.

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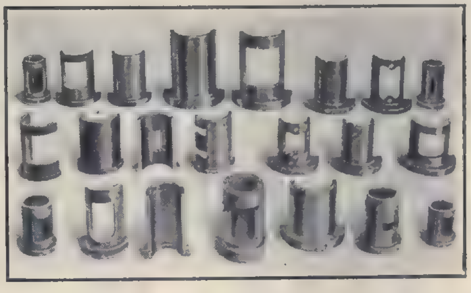
Prosperity

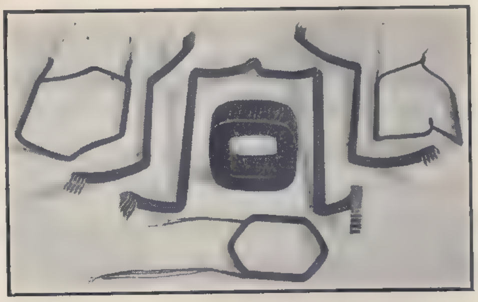
COLUMBIA
Bearings and Motor Coils

for electric railway companies



Interchangeable Bearings

By first grinding to a face and inserting castings in chucks divided to a perfect half, we are able to produce interchangeable bearings in perfect halves with outside diameter accurate to .003 in.



Armature and Field Coils

Made from best grade insulated wire, accurately moulded or pressed to desired dimensions. All insulating materials and compounds used are of the best quality obtainable.

We keep on hand, ample stocks of standard sizes of various coils, bearings and other parts. On most usual types shipment can generally be made immediately. When you desire some special part or unusual size, made to order, all we need is your rough sketch or description. Our well-known established policy is the use of finest materials, perfect work, and absolute accuracy. Whatever you want done, Columbia can do it.

Columbia can do it cheaper and better

Back to Prosperity

High Noon and Clear Sky

As the navigator checks his course by "shooting the sun" at noon, the wise electric railway executive checks his own course at every favorable opportunity. Even as a clear sky facilitates the observations of the skilled mariner, fair days in a business sense aid the electric railway man in his. So that these days of easier finances may be ever with you, check up all around. Check up what you get for what you pay and what you pay for what you get. And in this checking up process, see what Columbia facilities can do for you. We make this suggestion not solely because we want your orders, but because we believe that you as well as we will profit by doing business together—that we can each help the other Back to Prosperity.

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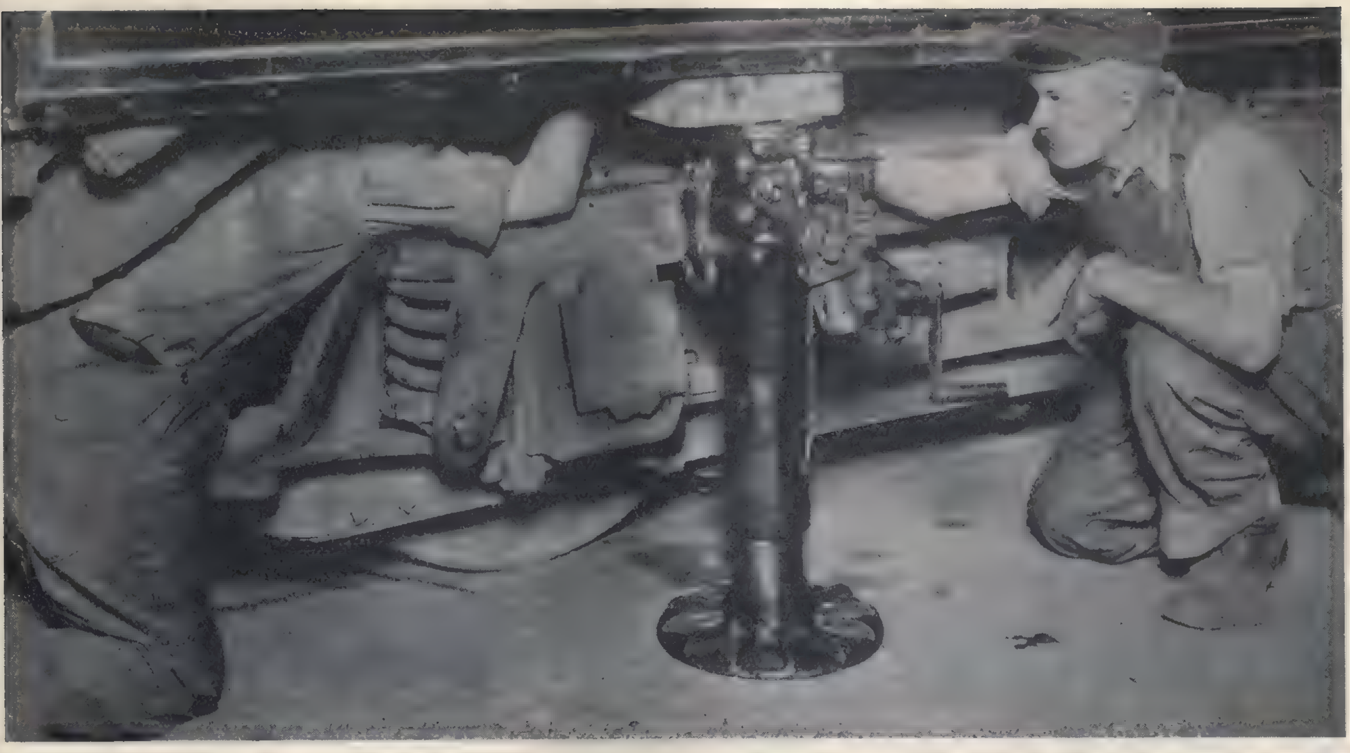

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for Car Shop, Emergency or Track Lifting Service—use Duff Jacks

Duff High-Speed Ball Bearing Screw Jacks are the fastest raising, most powerful and easily operated jacks in existence. Made in sizes from 35-tons up to 75-tons capacity.

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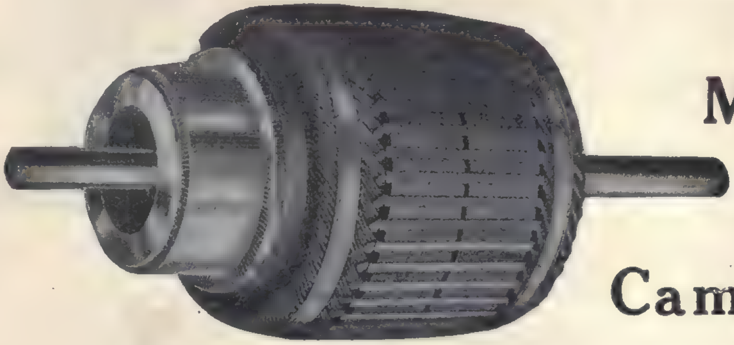

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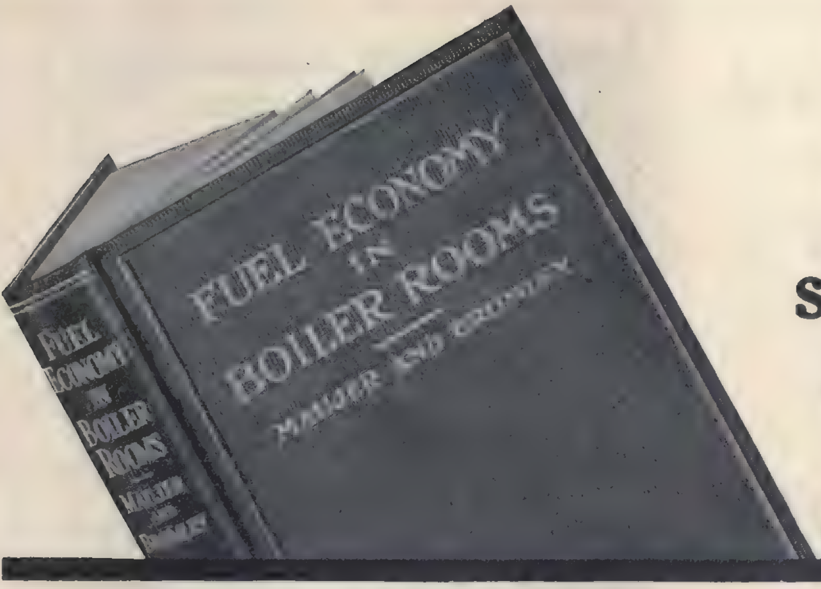

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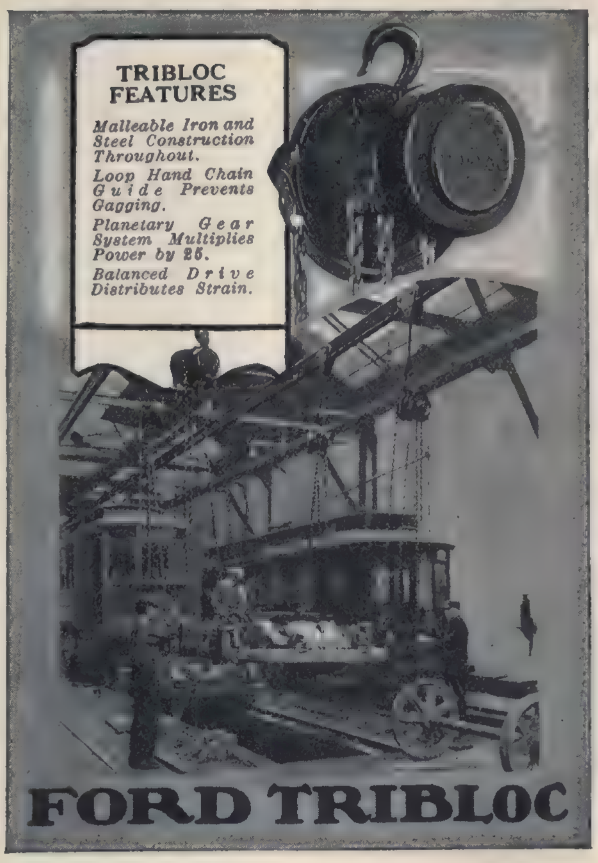

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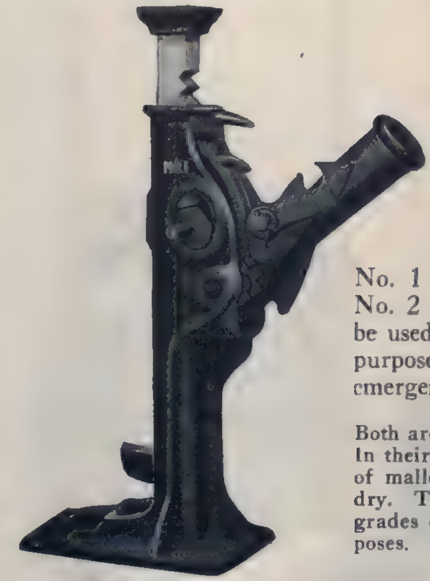

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These two jacks are most commonly used in the construction and maintenance of trackwork. A number of electric railways have made No. 2 a part of the equipment of each car for use in emergency cases. Both have been adopted and accepted by the engineers of all the larger railways in the United States—steam and electric.

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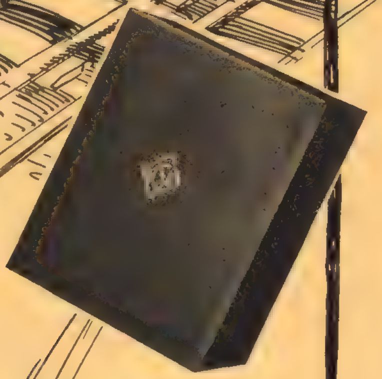

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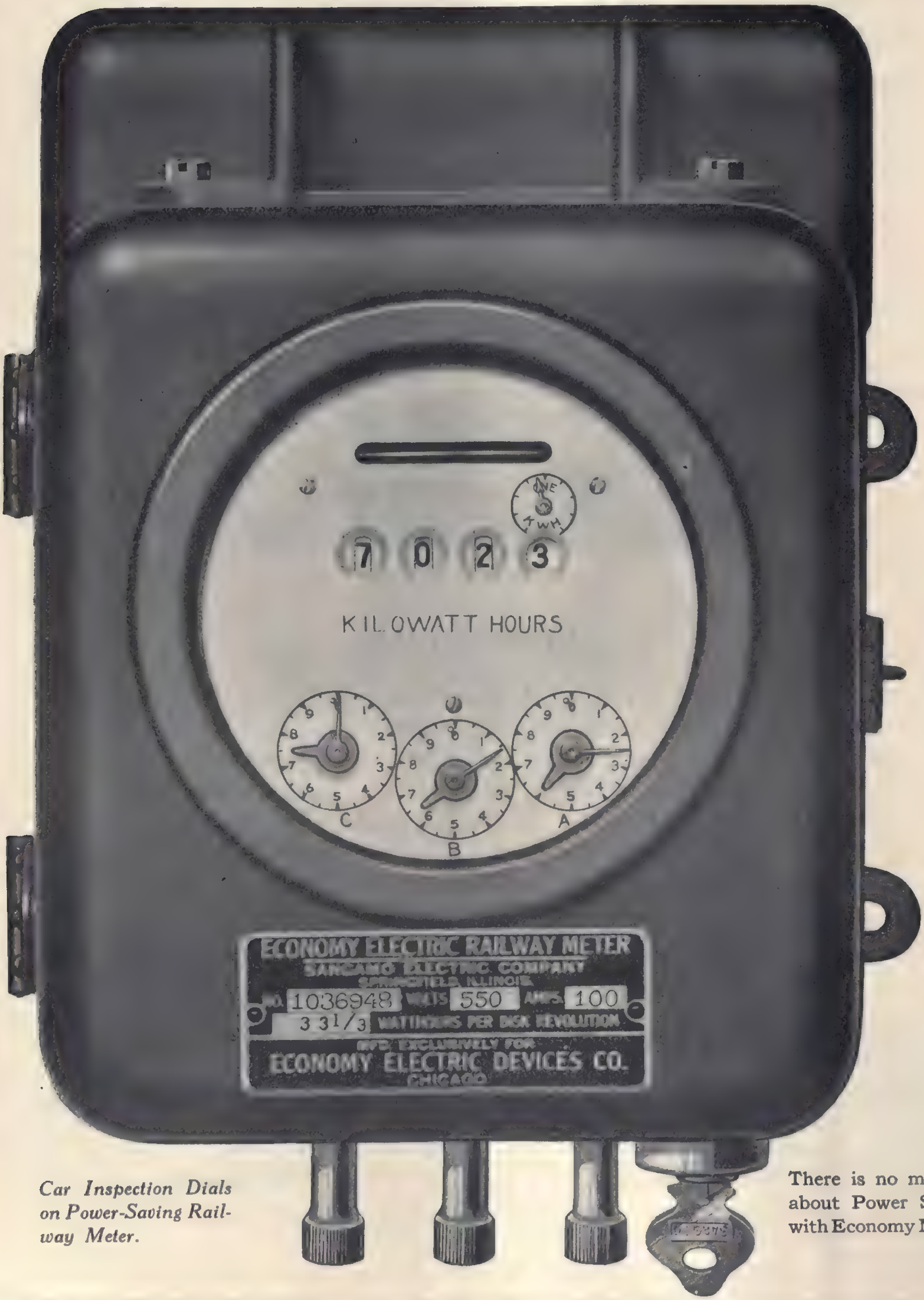
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* * *

Its use is simple. Motormen set down on a report card the meter reading when they take the car and when relieved. They know that every bit of abuse given the controller or brakes, and every needless or inefficient start or stop, will increase their total record. Thus the meter serves continuously as a monitor to stimulate a motorman to operate his car in accordance with the instructions given him. Comparisons of their relative energy consumption stimulate the men to better their records.

* * *

Energy input is the correct measure of the relative efficiency of different men operating under similar conditions. The motorman has faith in a meter because with it he can prove that good operation gives him a good record and poor operation a poor record, in actual energy consumption. This power-saving device actually tells the motorman and the management whether power has been saved or wasted, and how much.

That, in brief, is the underlying reason for the success of the ECONOMY Meter.

* * *

The ECONOMY "Power-saving" and Car Inspection Meter provides a method that accurately and automatically shows when car inspection is needed. It also shows at a glance how much more work a car can do before inspection is needed, or, in case of a road failure, how much work the car has done previous to the failure. All this without any clerical labor.

* * *

The ECONOMY Meter is a rugged device which requires remarkably little maintenance. Its principal element is also produced for central station and general metering. For this purpose more than 500,000 have been built. It is a standardized product, easy to maintain on a railroad at a cost averaging less than $2.00 per year, per meter.

* * *

More than one hundred street or interurban railways are completely equipped and the saving resulting has more than wiped off the capital charges plus operating expenses of the meters in the first year.

The records from ECONOMY Meters are of high value for managerial and engineering purposes.

ECONOMY METERS

Economy Electric Devices Company

L. E. Gould, *President*

Sangamo Economy Railway Meters (*General Sales Agents*) Lind Aluminum Field Coils

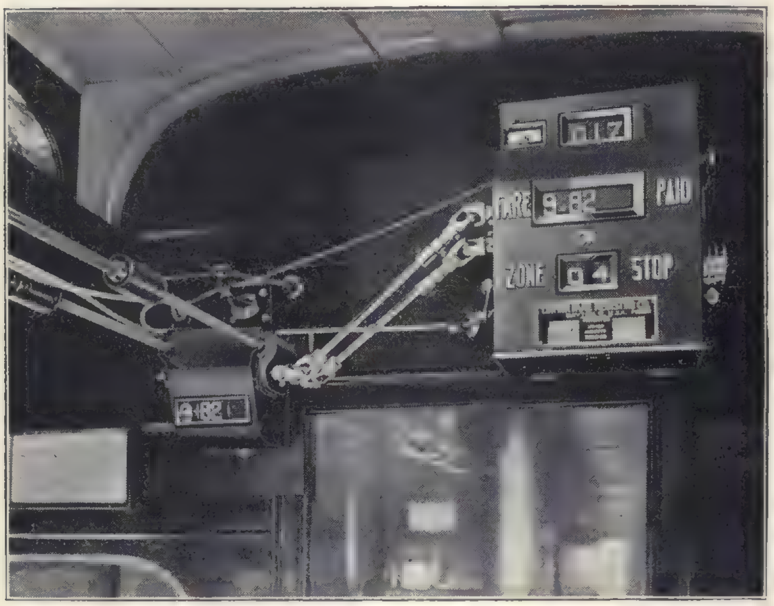
Peter Smith Heaters
Woods Fare Boxes
District Agents for
Bemis Boyerized Truck Specialties
Miller Trolley Shoes

1592 Old Colony Building, Chicago

Meter the energy—that's what you want to save

A New Interurban Fare Register

It indicates and records in detail any cash fare from 1 cent up to $9.99. It also registers the usual non cash denominations either with or without cash values.



The No. 62 Type Ohmer Fare Register

The No. 62 Type Ohmer Fare Register is intended for interurban service where a large variety of fare denominations are handled and where a detailed printed record of the amount and the origin of each fare is desired.

In addition to this new interurban register, we will have on exhibition at the Chicago Convention other new and interesting registers and operating equipments representing the last word in fare protecting devices. We invite you to our Exhibit.

OHMER FARE REGISTER COMPANY
DAYTON, OHIO

Follow the Consolidated Line

—the straight line to operating economy

Electric Heaters

Thermostatic Control

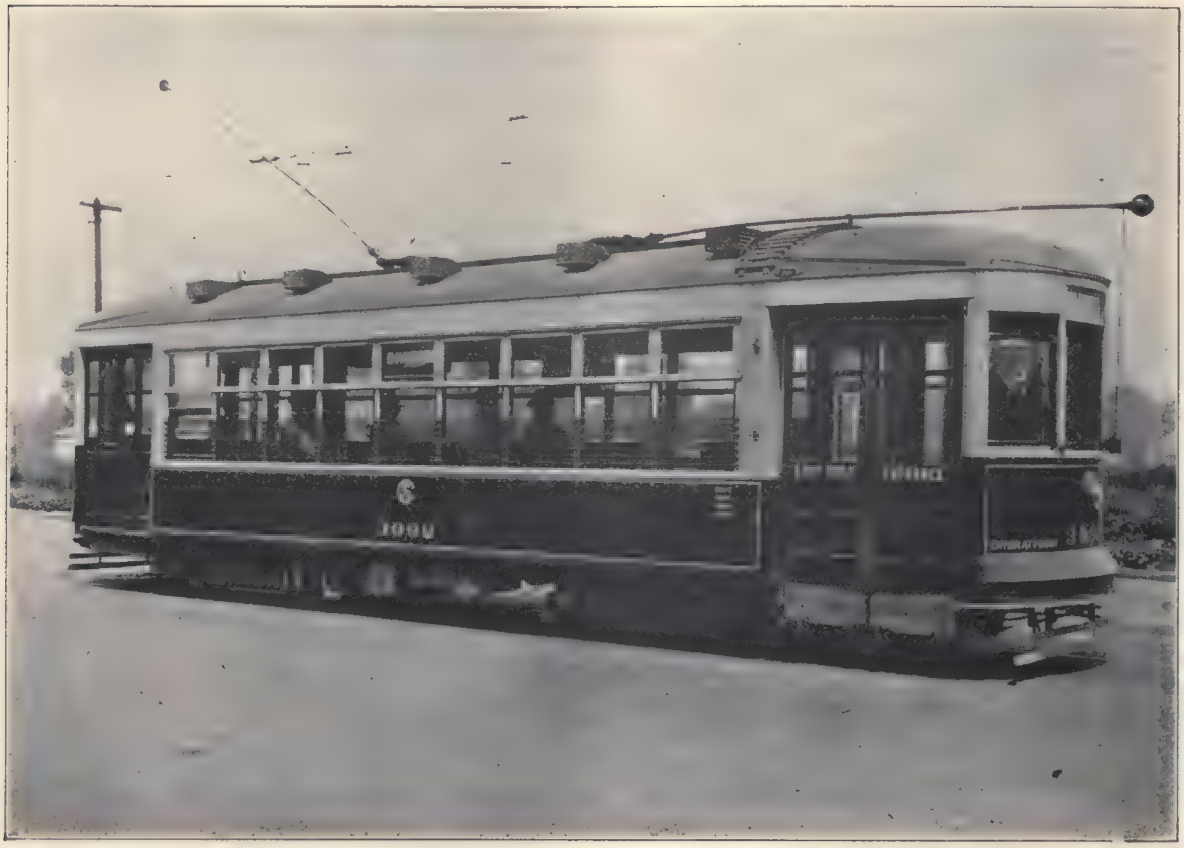
Pneumatic Door Operators

Buzzers and Bells

See—

Our Convention Exhibit
described on the following pages

Consolidated Car Heating Co.
Albany New York Chicago



CHICAGO CARS of the Most Modern Type

This new double-truck one-man type of car recently put into service in the Windy City was designed for lightest weight, economy in operation and maximum comfort and convenience for passengers. It seats 45 people and weighs but 14 tons.

CONSOLIDATED CA

Albany **Ne**

CONSOLIDATED
Electric Heaters and Push Buttons

are used on these cars because they meet the requirements of light weight and economy as well as lending to the comfort and convenience of passengers. Be sure and note Consolidated equipment when you inspect them.

HEATING COMPANY
York Chicago

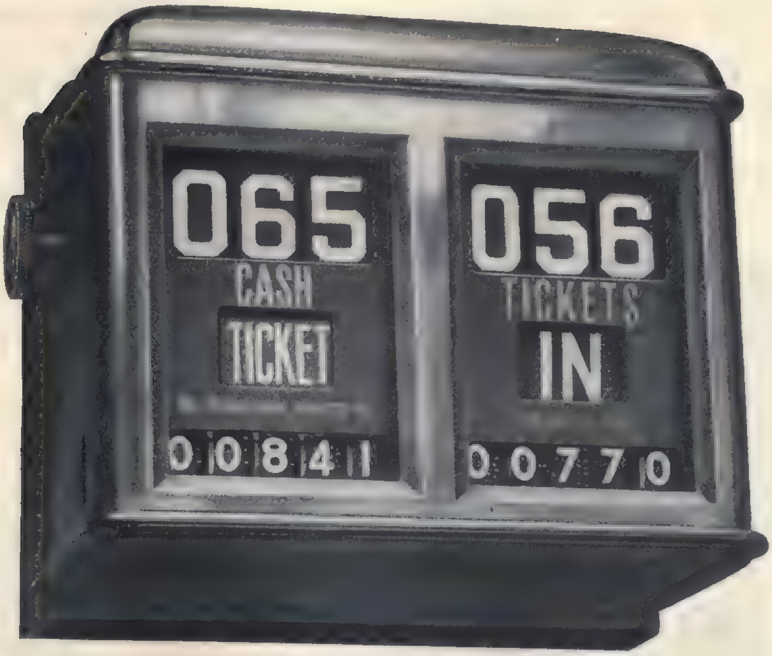
The Star Exhibit of the Convention

See the CONSOLIDATED

Display at Section B, Booths 9-14, at the A. E. R. A. Meeting

We will gladly demonstrate these devices and figure with you on your equipment problems. If you can't get to the Convention, write us.

Consolidated Car Heating Co.
Albany New York Chicago



International Fare Registers

help to secure full collections

International Fare Registers by their "Visible and Audible Registration" aid in securing full collections.

Safeguarding the collection system by simple and accurate registration on International Registers has become the standard practice on many of the leading street railway systems in this country and elsewhere.

Philadelphia with its 5,500 Single International Registers now in use, and Rio de Janeiro with its 900 Single and 400 Double Internationals attest the confidence of Managers of large systems in these Registers.

We might submit the cars of the Chicago Surface Lines as a part of our Convention Exhibit, as they are equipped with some 3,500 Single Internationals, and nearly all of the first 1,000 installed over twenty years ago are still in daily use and giving satisfactory service.

Thirty years' study of fare collection problems and methods and a like experience in the manufacture of dependable registers puts our organization in a position to offer helpful advice and to give unusual service in matters of fare collection and registration.

We shall show at the Convention our Type R-10 Single Register and our new Type R-11 Double Register, each of them electrically operated.

The International Register Company

15 South Throop St., Chicago

Manufacturers of Fare Registers and railway supplies, and General Selling Agents for

HEEREN ENAMEL BADGES

Type R-10
single register

HALE & KILBURN SEATS

For Electric Cars and Motor Buses

Stand the Test of Service

All Steel Seat—Rattan Spring Cushion

Light Weight Steel Seat Springless Cushion

Reversible and Stationary Seats
for every type of Car

Best Light Weight Seats
for One Man Safety Cars

Motor Bus Seats

With Our

Patented Space Saving Feature

Gives 1½ Inches More Knee Space
for Each Passenger

No. 108 Rattan Spring Seat

No. 108 Special Spring Edge Seat

Write For
Further Information

HALE & KILBURN CORPORATION

American Motor Body Co., *Successors*
1800 Lehigh Ave., Philadelphia

New York Chicago Washington Atlanta San Francisco

Nic Le Grand Inc.

NL

ROCK ISLAND
ILL.

NEW SAFETY APPLIANCE FOR ONE-MAN CARS

Makes Your One-Man Cars Safe
at Less First Cost and Less Maintenance Cost

The March of **Progress** goes on. Nothing can stop it.

The Law of **Improvement** will not be denied. Inventive genius is ever at work.

When you buy machine or tool it is the **Best** you want.

We now offer to the industry the

Positive Safety Appliance

For New and Converted One-Man Cars.
It is what the Name implies—

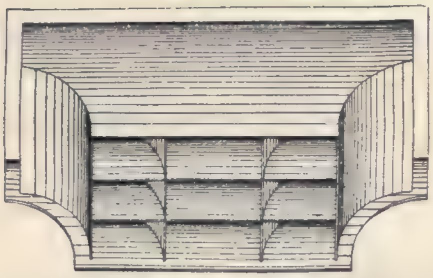
POSITIVE!

Lower First Cost
Less Material Required For Installation
Lower Installation Cost
Less Weight Added to Car

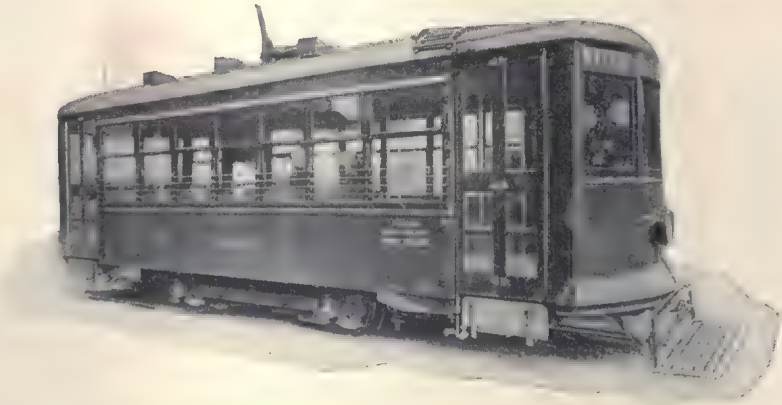
If You Contemplate Converting Cars to One-Man Operation or Buying New Safety Cars, Write Us.

MAIL THAT ORDER TO NIC

"National Rail



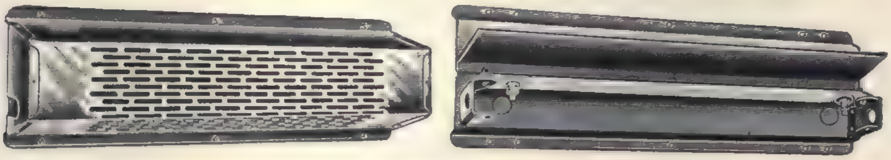
Garland Ventilators



National Safety Car Equipment Co's One-Man Safety Cars

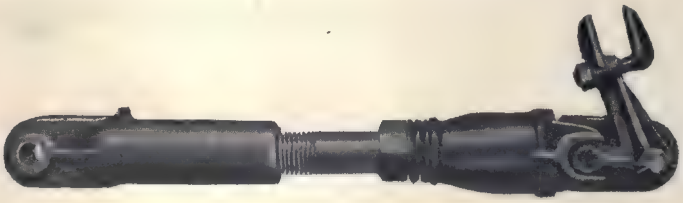
The "NATIONAL" Line

- Tool Steel Gears and Pinions
- Economy Power Saving Meters
- Johnson Fare Boxes
- H & W Electric Heaters
- Garland Ventilators
- Drew Line Material and Railway Specialties
- Peerless and Perry Side Bearings
- Hartman Centering Center Plates
- Anderson Slack Adjusters
- Anglo-American Varnishes, Paints, Enamels, Surfacers, Shop Cleaner
- Geneseo Paint Oils
- Central Equipment Company's Hand Holds
- Tnemec Cement Paint
- Pitt Sanders
- National Safety Car Equipment Co.'s One-Man Safety Cars
- Truck and Car Repair Parts
- Dunham Hopper Door Device
- Feasible Drop Brake Staffs
- Flaxlinum Insulation



H & W Electric Car Heater
Panel Type

The Cutler-Hammer Heating Unit



Anderson Slack Adjuster

Get our quotations on equipment

B. A. Hegeman, Jr

Charles C. Castle, First Vice-President
Harold A. Hegeman, Vice-Pres. and Treas.

NATIONAL RAILWAY

Grand Central Terminal, 452 L

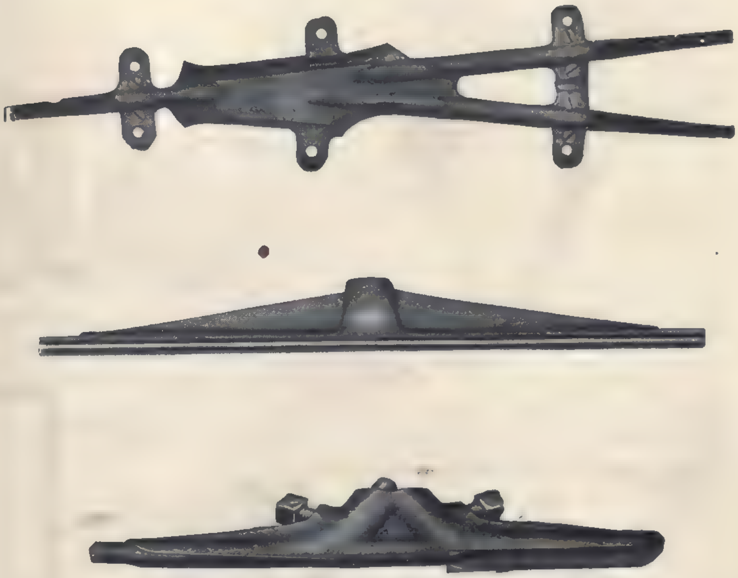
BRANCH

Munsey Bldg.
Washington, D. C.

Hegeman-Castle Corporation
Railway Exchange Bldg., Chicago

way Specialties"

"The Watchdog of Your Power"
Economy Electric Meters



Drew Line Material

Johnson Fare Boxes

Tool Steel Gears and Pinions

and maintenance materials!

President
W. C. Lincoln, Mgr. Sales and Engineering
Fred C. J. Dell, Secretary

APPLIANCE COMPANY

exington Ave., Cor. 45th St., N. Y.

OFFICES
100 Boylston Street,
Boston, Mass.

85 Union Trust Bldg.,
Harrisburg, Pa.

Collier

COLLIER Service assures local concerns "National" quality advertising and railways permanent maximum revenue.

Through Collier Service local advertisers now compare favorably with the great advertisers in the quality of their car card advertising.

Artists of rare ability, skilled writers and masters of the printing and engraving crafts have been employed to produce the most effective car card advertisements possible.

Only through the magnitude of the Collier Organization could such talent be secured. Only

Service

through the magnitude of the Collier Organization could the initial expense required in the preparation of such high quality advertising be made. Only through the magnitude of the Collier Organization is it possible to reduce the cost per card to a minimum. Only through the magnitude of the Collier Organization are local advertisers enabled to advertise continuously in the most effective manner.

Electric Railways — large or small—operating under Collier Service are assured through high quality advertising in their cars, of **permanent maximum revenue.**

Barron G. Collier
INCORPORATED

"ACME LINE" OF RAILWAY APPLIANCES

Kass Safety Tread Steps are used n the new equipment of the Chicago Surface Lines, and in Cleveland, Detroit, Washington, D. C., Milwaukee, Minneapolis, New York, Denver, etc.

Slippage Is Absolutely Prevented

The first step to take in reducing carelessness is the Kass Safety tread step.

It is so designed that slippage is absolutely prevented and the likelihood of accidents to passengers is reduced to a minimum.

Economy and durability have been considered—the Kass Step is pressed from such heavy metal that it will give an unlimited service.

It can be furnished for *all* conditions, either in a complete flight of steps, individual treads or as plates for steps now in service.

Ask for a copy of our special bulletin

Other "Acme" products are Car Window Curtains and fixtures, Diaphragms, Steel Doors and fixtures, Weatherproof Windows, Steel Flooring and Stampings of all kinds. *Separate Bulletins sent on request.*

Morton Manufacturing Company

General Offices and Factory
5133-39 West Lake Street, Chicago, Illinois

Sales Representatives in Following Cities:

New York, 50 Church Street
San Francisco, 797 Monadnock Building
St. Louis, Frisco Building
St. Paul, Merchants Bank Building
Washington, D. C., 630 Louisiana Avenue
Sheffield, England, A. G. Wild, Ltd.

Funny Thing— Human Nature!

—But it is very valuable to railway operators

When we were in the leave areas of France, we used to make Y. M. C. A. purchases with Canteen checks. We bought checks to save time lost in making change. Spending tickets didn't seem to mean as much to us as spending actual coin—hence we spent freely and often.

It's this same brand of human nature that makes people ride more often on your cars when they pay their fares with Globe Tickets instead of with nickels, pennies and dimes.

And those people who would rather walk than break a quarter—they'll ride if you sell them Globe Tickets. To most people "tickets is tickets" and not quarters or half-dollars.

GLOBE TICKET CO.

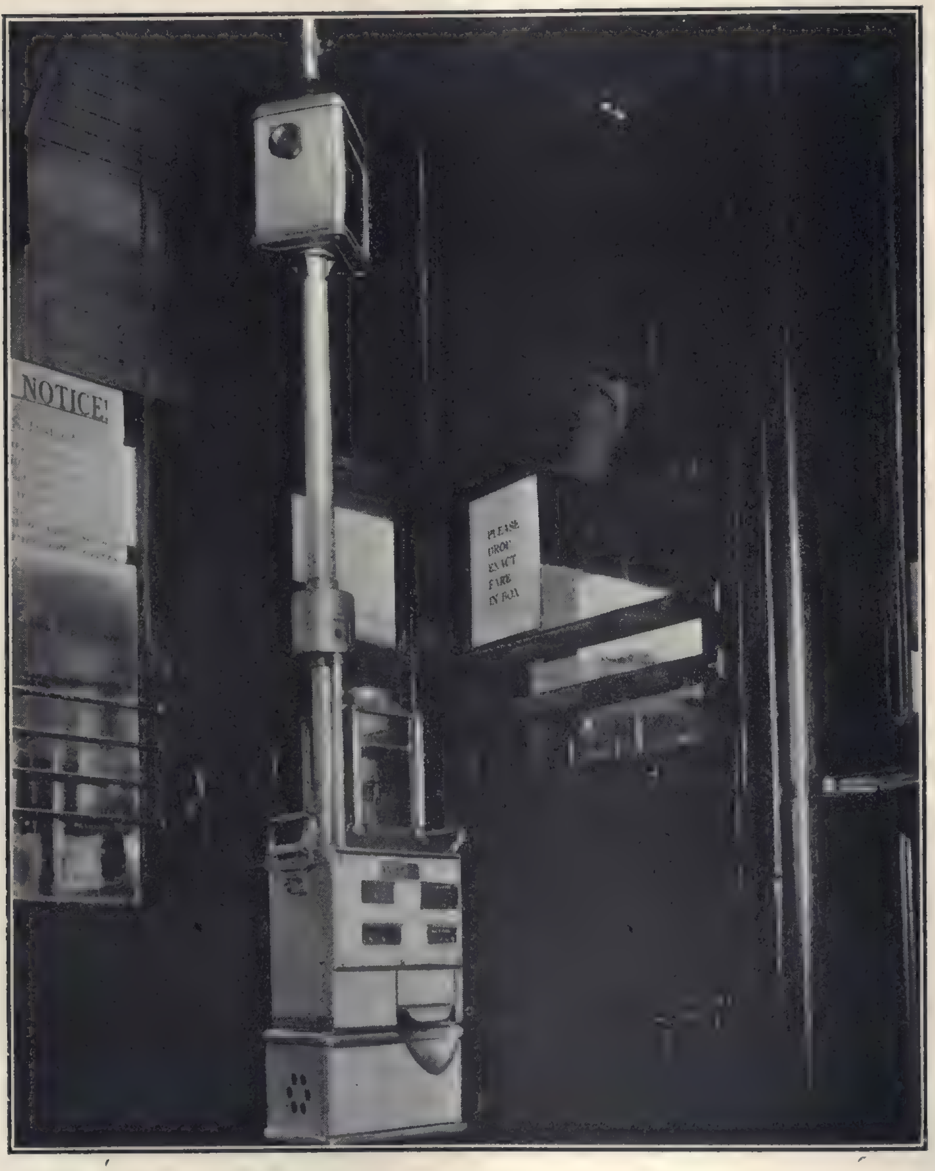
New York Office, 160 W. 14th Street
Philadelphia, Pa., 112 N. 12th Street

VIRGINIA RAILWAY AND POWER COMPANY
SUBJECT TO CONDITIONS NAMED ON COVER
GOOD ONLY ON NORFOLK RY. & LIGHT CO. DIVISION AND ON BERKLEY LINES
SCHOOL TICKET
GEN. MGR.
NEW YORK STATE RAILWAYS
ONE 7¢ FARE
ROCHESTER LINES
SUBJECT TO CONDITIONS OF CONTRACT BETWEEN CITY AND COMPANY
PRESIDENT
VIRGINIA RAILWAY AND POWER COMPANY
GEN. MGR.
34th St. Crosstown Line EAST
P. M.
This Coupon denotes that hour punched on body of transfer is P. M.
Not good if detached
34th Street
NEW YORK
Public Service Railway Co.
PALISADE LINE
004600
NOTICE Not good if detached
PUBLIC SERVICE RAILWAY
04600
NORTH BOUND
M. HOUR
GLOBE

Tickets and Transfers

Announcing the New

JOHNSON FARE BOX



The pictures on these two pages show the new Johnson Fare Box in operation on a standard car of the Chicago Surface Lines.

AT LAST we are able to offer the street railways of the country a fare box which collects, registers and checks each fare automatically and instantaneously. Operating men have long awaited just such a device—a box that will accomplish as a unit what the previous types of registering boxes do when used with separate overhead clock registers.

Many years of careful development have enabled us to perfect this new box which, in addition to accurately registering the fare and flashing notice to the conductor of all errors, rings up each fare on a register which is elevated high enough to be in plain view of all passengers as well as of the conductor. A splendid idea of how the complete unit looks may be had, from the illustration on the left-hand page.

The conductor is relieved of the necessity of grinding fares through by hand by a motor drive directly on the box. This insures instantaneous registration of each fare as secured.

There are three distinct registering features: The usual dials on the box proper analyze the receipts; a dial on the rod indicates any error in the amount of fare deposited; and the upper register indicates the number of fares.

The new box can be set to handle six kinds of coins—nickels, pennies, dimes, Canadian nickels and two sizes of metal tickets. It can be quickly and easily changed to meet the needs occasioned by a change in fare.

A motor at each end of the car, enclosed in a Duralumin box, supplies the drive. These motors develop 1/50 hp. at 550 volts. One box is all that is required for a car, the conductor carrying it from end to end as required. The stationary motor-box upon which the operating unit rests is plainly shown in the illustration to the right.

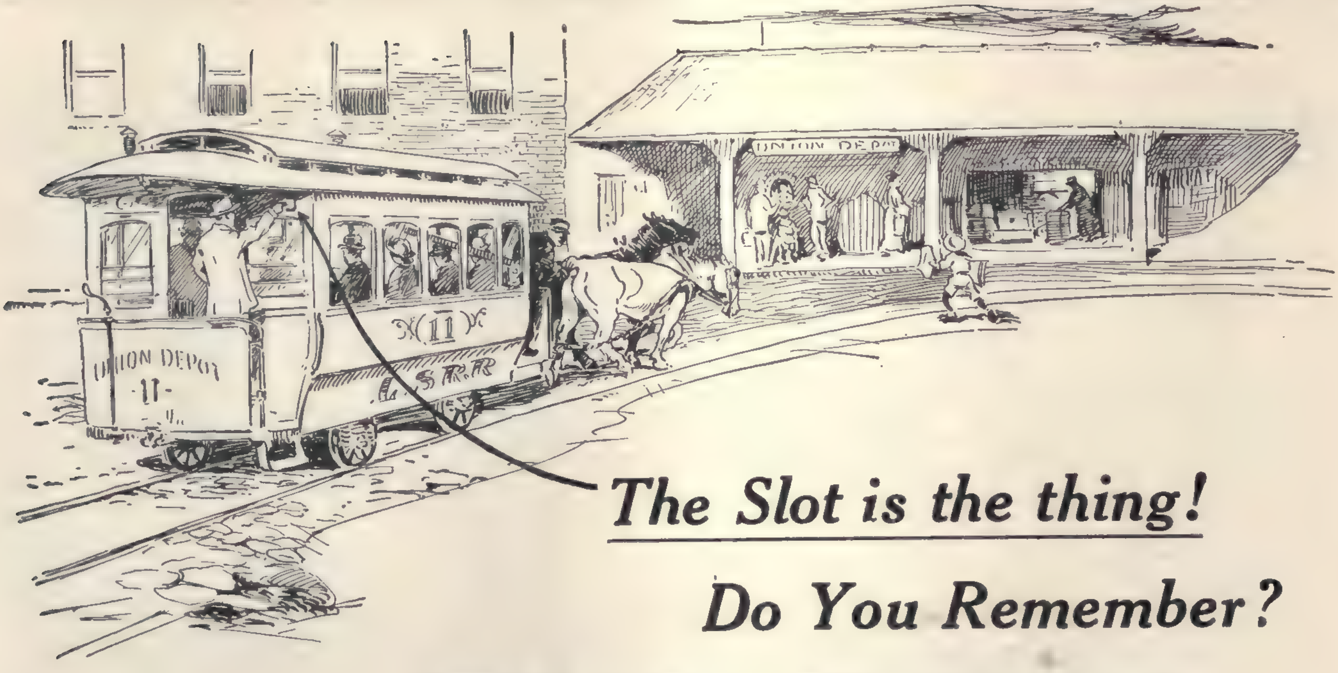
The efficiency of this really marvellous unit is made complete by its compactness. The picture at the top of this page shows how little space it occupies in the vestibule of a standard type of car.

This is the box you have been waiting for. See it at Booth No. 27-30 Sec. F, A. E. R. A. Convention, Municipal Pier, Chicago.

If you are perplexed by a fare-collection problem we invite you to lay it before us in detail. We are specialists in fare collection and can undoubtedly assist you. Our comprehensive line of fare boxes embraces types for every need, and our recommendations will be made with a view of safeguarding your interests.

JOHNSON FARE BOX CO., Ravenswood, Chicago

Grand Central Terminal Bldg., New York



The Slot is the thing!

Do You Remember?

Remember the old depot car in Louisville twenty-five years or more ago? You climbed on board, and dropped your nickel in the slot-mouth of a coin chute which permitted the coin to slide by gravity to the front end where the old-time locked fare box was set to catch it? Remember how the driver had to turn around and watch to see that the necessary coin was forthcoming from each and every passenger? Similar coin-in-slot fare receiving appliances were in use on the old Fifth Avenue stages. Unfortunately these crude old gravity operated coin conveyors caused some people to believe that the coin-in-slot principle must necessarily be crude and operate along these old-fashioned lines.

The ROOKE System

We were the pioneers in advocating, developing and perfecting the slot method of fare collection as applied to modern railroading conditions. We realized that *slot registration*, of his own fare, by each individual passenger is the only fare collection method yet devised to get all the fares.

The ROOKE System is built around this basic principle and it has stood the test of twenty years' successful service. Recently the largest mass transportation system in America has adopted a slot system of fare collection at its heaviest transportation points. This in itself is ample evidence that the slot method of fare collection is fast and that it is complete.

The old notions of imaginary limitations to the slot method and old-fashioned prejudices against it are dying out.

There is a vast difference between the old gravity method and the perfected ROOKE system of the present day. The old way depended on gravity to roll the coin down to the fare box and registration, if accomplished at all, was left to the convenience of the driver. The ROOKE System, still employing the slot method, causes the passenger to register his own fare as he inserts the coin in the slot, and the employee's part in the transaction is one of co-operating with the passenger and receiving the fare *after it is registered*. This is the distinguishing feature of the ROOKE System, which makes it get *all the fares for the company*.

In the days of the Louisville depot car, about all that could be expected in the way of passenger co-operation was the dropping of the coin in the slot. Nowadays we are in the "self-service" age. The public has been educated to co-operate in various ways with its public servants. The gum machine, the automatic telephone, and even the self-service restaurant are familiar examples. The ROOKE System merely capitalizes this type of public co-operation in the collection and registration of the fares.

The ROOKE Automatic Register, takes and registers, not only nickels, but also dimes and quarters, or metal tokens.

ROOKE AUTOMATIC REGIS

The greatest little Gold-Getter since King Midas

At left—the Rooke Portable detached for seat collections.

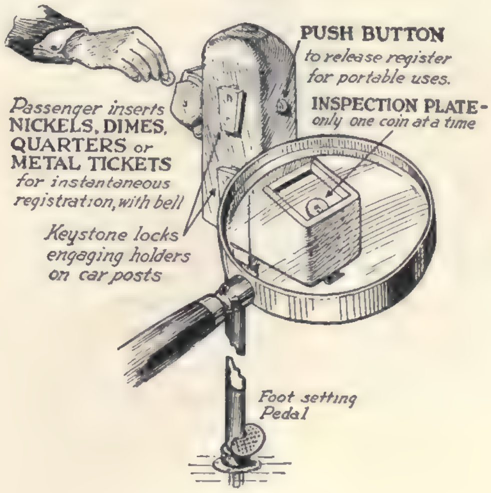
Below — the Rooke Portable mounted in foot-controlled shell for platform collection.

Rooke Box Portable
for
Standardizing Fare Collection

No car registers to check up, no delays and confusion changing conductors and operators, no discrepancies in auditing. With the ROOKE System the conductor's register is all that is audited regardless of how many cars or on what type of cars he has worked during the day.

Installed as a stationary box for fixed point or one-man collecting, the conductor has both hands free and simply presses a button to unlock and lift out the familiar ROOKE portable when it is necessary to go after fares. Fare registration is positively determined at passenger's finger tips. Everything traveling south of this first point of contact between coin and mechanism is your money. It cannot be diverted. The register cannot be tricked. The conductor cannot be imposed upon. The fare-box housing is merely a shell or holder of aluminum and bronze castings with a few large free-working, metal-encased parts that will not get out of order.

With either the "big box" or the "little box," so called, all your cash and metal ticket collections are always paid and registered in the same way, no matter where, when or on what type of car collected.


PUSH BUTTON
to release register for portable uses.
Passenger inserts NICKELS, DIMES, QUARTERS *or* METAL TICKETS *for instantaneous registration, with bell*
INSPECTION PLATE-
only one coin at a time
Keystone locks engaging holders on car posts
Foot setting Pedal

The entire operation is simple and direct and is the logical way of securing any kind of fare. It is all that a fare box is, and more, because the register is so portable that auditing is facilitated and because it makes the passenger register his own fare whether he does it when he enters or leaves or after he has slipped into a seat.

TER COMPANY, Providence, R.I.

Five times faster than the hand method

Ask—

Springfield, Mass.
Terre Haute, Ind.
Providence, R. I.

The Shanklin Transfer machine makes all necessary punches, tears off the transfer and delivers it to the passenger—all with a minimum of effort and attention on the part of the operator or conductor. The pressing of one button adjusts the mechanism and a tap on a foot lever does the rest. It handles crowds like an adding machine handles figures.

There are no wasted transfers as none are punched until issued. Besides this saving on paper there is reduced expense on handling and checking.

It has certainly made good in Springfield, Providence and Terre Haute—just as the Shanklin Zone Issuing Machine has made good in New Brighton, Pa., Providence, R. I. and London, Eng.

Owing to our preparation for immediate installations, it is impossible for us to exhibit at the Convention. Let us help you solve your problems.

SHANKLIN EQUIPMENT CO., INC.
356 MAIN STREET, SPRINGFIELD, MASS.

SHANKLIN Transfer Machines

PEACOCK BRAKES

on the fastest heavy interurbans

THE PEACOCK IMPROVED

Here is an electric interurban road noted the whole country over for its fast trains and safe, luxurious service. On the Chicago, North Shore & Milwaukee eighty miles an hour is regularly scheduled on certain parts of the line for express service. Of course, they have the finest air brake system that money can buy.

They also have Peacock Brakes, recognized as an essential part of a properly and safely equipped electric railway car.

Peacock Improved

Peacock Brakes cost little if any more than the most ordinary type of hand-brake. They are far cheaper in the end, because the maintenance costs are much less. One large set of equipment we sold never required a repair part in five years.

We have demonstrated in many cases that roads can actually save money by throwing out old hand-brakes and equipping with Peacocks.

When converting old cars for modern operation, it is an economical as well as safe move to equip them with Peacock Brakes.

Ask our representative about the cost of installing and maintaining Peacock Brake Equipment.

NATIONAL BRAKE COMPANY, INC.

890 ELLICOTT SQUARE, BUFFALO, NEW YORK
Canadian Representative: Lyman Tube & Supply Co., Montreal, Can.

Make Your Biggest Cars

Rear-Entrance Front-Exit

One-Man Cars

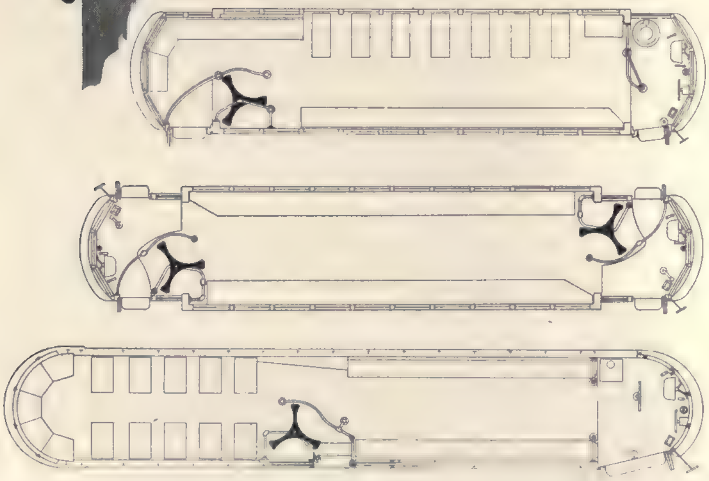
with this mirror and the

SYRACUSE CAR TURNSTILE

Now you can combine the great economy of one-man operation with the passenger-carrying capacity of the largest double-truck cars. Placed at the rear-end, the Syracuse Car Turnstile makes possible rapid loading, orderly passenger flow and unimpeded exit. It does away with congestion about the front-end, which is one of the biggest drawbacks with the present one-man method of operation. It also relieves the car operator of interference from pushing, jostling crowds about his elbows.

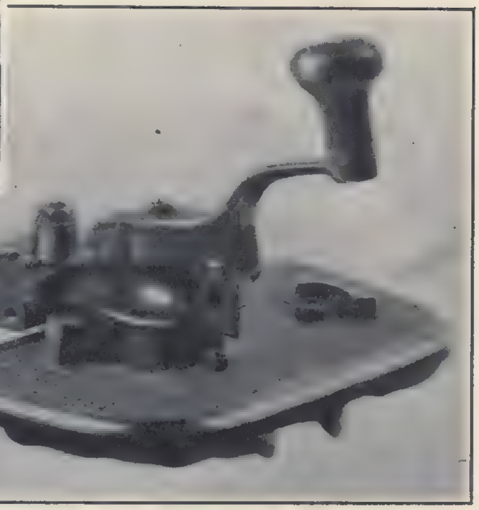
Safety is assured with the Syracuse Car Turnstile and the operator's mirror. The motorman controls the rear door and the turnstile controls the passengers. It permits entrance and prevents egress. It can be interlocked with the braking system so as to release automatically in an emergency, and can be unlocked also by the motorman, when necessary to permit passengers to leave by the rear.

For
Single-End Cars
Double-End Cars
Peter Witt Cars



Send for full description, or better still, come to Syracuse yourself and see this system in actual operation on the cars.

THE TURNSTILE CAR CORPORATION
383 West Fayette St., Syracuse, N. Y.
W. M. Lawyer, Sales Manager



Don't Scrap Any Air Equipment

When equipping your one-man cars with safety features

Our Pilot Valve controls both the emergency application of brakes and gives selective door operation. You need not touch your present brake valves when installing our Safety Equipment.

Some of the advantages:—

Automatic application of brake and cutting off of power if air pressure gets too low.

Doors do not balance at once on application of emergency brake, but only after time interval sufficient for car to come to stop.

In applying and releasing brakes from brake valve, no parts of safety equipment move:—thus reducing maintenance.

Simple piping.

Let us tell you more about the safety, cost and ease of this installation. We are prepared to save you money and give you the last word in safety protection.

E. Z. CAR CONTROL CORPORATION

383 West Fayette St., Syracuse, N. Y.

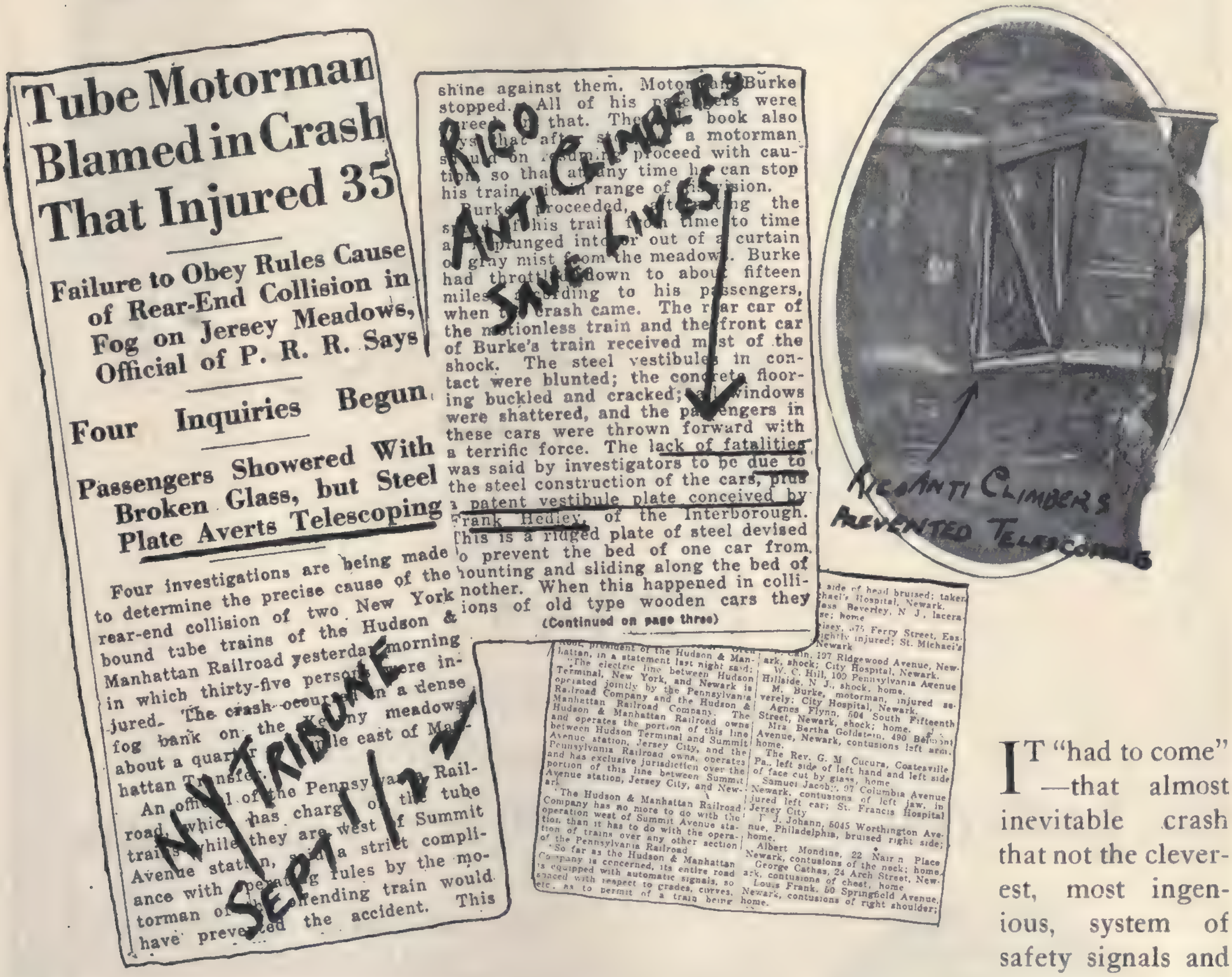
W. M. Lawyer, *Sales Manager*

Trolley Cord and Samson Signal Cord

Modern transportation with one-man cars and multiple-unit trains demands the greatest care in the selection of even the smallest items. Delays and annoyances must not occur on the road. Samson Cords are strong and durable. They resist abrasion. Their smooth flawless finish insures maximum wear, and freedom from jamming and snarling. Look for Samson Spot Trolley Cord, the Cord with the Colored Spots.

Samson Cordage Works, Boston, Massachusetts

RICO ANTI-CLIMBERS prevented telescoping!



Tube Motorman Blamed in Crash That Injured 35

Failure to Obey Rules Cause of Rear-End Collision in Fog on Jersey Meadows, Official of P. R. R. Says

Four Inquiries Begun

Passengers Showered With Broken Glass, but Steel Plate Averts Telescoping

Four investigations are being made to determine the precise cause of the rear-end collision of two New York bound tube trains of the Hudson & Manhattan Railroad yesterday morning in which thirty-five persons were injured. The crash occurred in a dense fog bank on the Ke[illegible]ny meadows about a quarter [illegible] mile east of Manhattan Transfer.

An offi[illegible]l of the Pennsylvania Railroad, which has charge of the tube road, while they are west of Summit Avenue station, said a strict compliance with operating rules by the motorman of the offending train would have prevented the accident. This

shine against them. Moto[illegible] Burke stopped. All of his pa[illegible]ers were [illegible]reed [illegible] that. The [illegible] book also [illegible]ys that aft[illegible] st[illegible] a motorman should on resuming proceed with caution so that at any time he can stop his train with[illegible] range of [illegible]vision.

Burke proceeded, [illegible]ing the sp[illegible] of his trai[illegible] from time to time a[illegible] plunged into or out of a curtain o[illegible] gray mist from the meadows. Burke had throttled down to about fifteen miles, according to his passengers, when the crash came. The rear car of the motionless train and the front car of Burke's train received most of the shock. The steel vestibules in contact were blunted; the concrete flooring buckled and cracked; all windows were shattered, and the passengers in these cars were thrown forward with a terrific force. The lack of fatalities was said by investigators to be due to the steel construction of the cars, plus a patent vestibule plate conceived by Frank Hedley, of the Interborough. This is a ridged plate of steel devised to prevent the bed of one car from mounting and sliding along the bed of another. When this happened in collisions of old type wooden cars they

(Continued on page three)

[illegible] president of the Hudson & Manhattan, in a statement last night said:

"The electric line between Hudson Terminal, New York, and Newark is operated jointly by the Pennsylvania Railroad Company and the Hudson & Manhattan Railroad Company. The Hudson & Manhattan Railroad owns and operates the portion of this line between Hudson Terminal and Summit Avenue station, Jersey City, and the Pennsylvania Railroad owns, operates and has exclusive jurisdiction over the portion of this line between Summit Avenue station, Jersey City, and Newark.

"The Hudson & Manhattan Railroad Company has no more to do with the operation west of Summit Avenue station than it has to do with the operation of trains over any other section of the Pennsylvania Railroad.

"So far as the Hudson & Manhattan Company is concerned, its entire road is equipped with automatic signals, so spaced with respect to grades, curves, etc., as to permit of a train being

[illegible] side of head bruised; taken [illegible]chael's Hospital, Newark.
[illegible]ess Beverley, N. J., lacera[illegible]se; home
[illegible]isey, 475 Ferry Street, Eas[illegible] slightly injured; St. Michael's Newark
[illegible] Cain, 197 Ridgewood Avenue, Newark, shock; City Hospital, Newark.
W. C. Hill, 100 Pennsylvania Avenue Hillside, N. J., shock, home.
M. Burke, motorman, injured severely; City Hospital, Newark.
Agnes Flynn, 504 South Fifteenth Street, Newark, shock; home.
Mrs. Bertha Goldstein, 490 Belmont Avenue, Newark, contusions left arm, home.
The Rev. G. M. Cucura, Coatesville Pa., left side of left hand and left side of face cut by glass, home
Samuel Jacoby, 97 Columbia Avenue Newark, contusions of left jaw, injured left ear; St. Francis Hospital Jersey City
F. J. Johann, 5045 Worthington Avenue, Philadelphia, bruised right side; home.
Albert Mondine, 22 Nairn Place Newark, contusions of the neck; home.
George Cathas, 24 Arch Street, Newark, contusions of chest, home
Louis Frank, 60 Springfield Avenue, Newark, contusions of right shoulder; home.

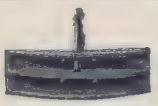
NY TRIBUNE
SEPT 1/22

RICO ANTI-CLIMBERS SAVE LIVES

RICO ANTI CLIMBERS PREVENTED TELESCOPING

IT "had to come"—that almost inevitable crash that not the cleverest, most ingenious, system of safety signals and rules could avoid so long as "the human element" was a factor. But RICO ANTI-CLIMBERS *did not fail* to function—*did not fail* to prevent the ghastly telescoping—*did not fail* to save lives and serious injuries to passengers. If RICO ANTI-CLIMBERS had not been on these cars--can you picture what *might* have happened? Surely this is a lesson that needs no further comment!

RICO ANTI-CLIMBERS
An Ounce of Prevention



Combined Anti-Climber-Drawhead

Heavy Weight Rolled Steel Section

Light Weight Rolled Steel Section

RICO COASTING RECORDERS
RICO TERMINAL RECORDERS
RICO SANITARY STRAPS
RICO VACUUM OILERS

RAILWAY IMPROVEMENT CO., 61 BROADWAY, NEW YORK

RICO

The World's busiest corner—Chicago 1922

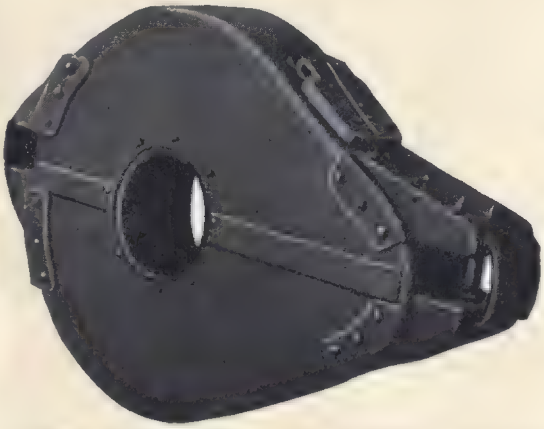
GEAR CASES

were not among the items considered by the purchasing agent of the Chicago City Railway Company long before this picture was taken.

TODAY

Thousands of Cars on the Chicago Transportation Lines are equipped with the

Chillingworth One-Piece Gear Case



End Supported Case weighs 50 lbs. for Safety Car Motors

Made from special deep drawn Open Hearth Steel

Made in a plant devoted exclusively to the manufacture of gear cases.

A highly Specialized Product combining light weight with strength and durability, and eliminating objectionable seams and rivets.

See them on the Pier, Chicago, Oct. 2-6, 1922

Chillingworth Mfg. Co., Jersey City, N. J.

Chicago Office: H. F. Keegan Company

J. H. Denton, New York City
W. F. McKenney, Portland, Ore.
Scholey & Co., London, England
The Normac Co., Japan

Union Electric Company, Pittsburgh
P. W. Wood, New Orleans, La.
Railway & Power Eng. Corp.,
Toronto and Montreal, Can.

GRIFFIN F. C. S. Wheels

From the standpoint of both *Economy* and *Safety* the CHILLED IRON WHEEL is the ideal wheel for *all classes of service.*

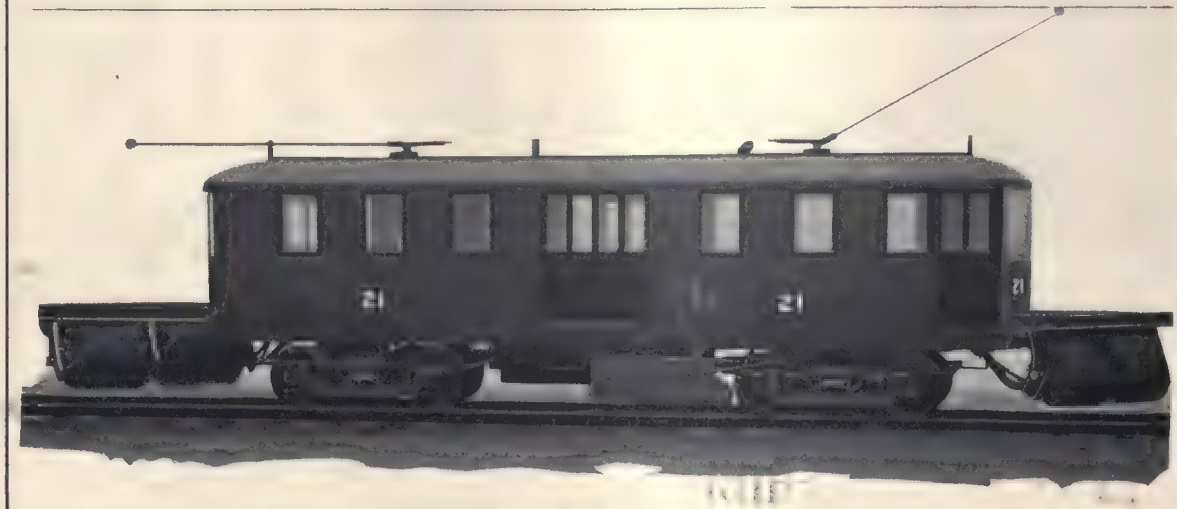
LOW COST
MAXIMUM
MILEAGE

Facilities at each foundry for mounting wheels on axles

Griffin Wheel Company
McCormick Building, Chicago, Ill.

FOUNDRIES:
Chicago Detroit Boston Los Angeles Denver
St. Paul Tacoma Kansas City
Council Bluffs

Snow Fighting Equipment



Double Truck, Steel Underframe Sweeper

THE utility and economy of this Combination Snow Sweeper and Baggage, Express and Work Car are obvious. It is adaptable for service in all seasons of the year. Extreme length is 49 ft. 1 in. over the brooms. Exterior width over all is 8 ft. 6 in. when used as Snow Sweeper.

The car body over the buffers, with the brooms removed, when used as a work car is 35 ft. 0 in. in length.

The underframing of the car is entirely of structural steel, sills being 8 in. "I" beams; buffers 7 in. by 3– in. angles. The frame is is braced diagonally, making the same very rigid and strong. The super-structure of the car is of wood, of standard baggage car construction. Car is sheathed both inside and out. Roof is of the "turtle deck" type, covered with No. 8 cotton duck.

Brooms and broom-driving mechanism, also the side plows can be readily removed in order that car can be used as express baggage, or work car during summer months.

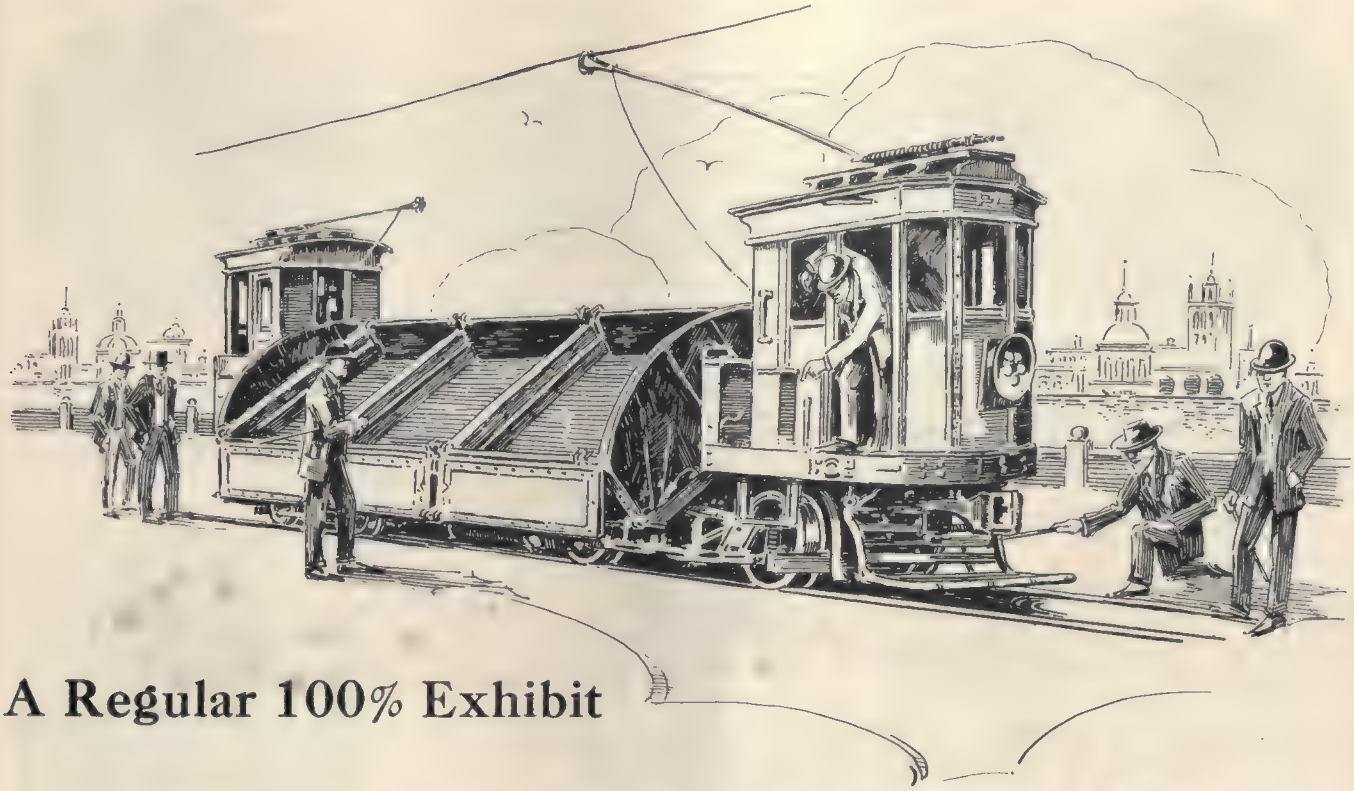
Blueprints and specifications will be submitted on request.

Selected Snow Sweeper Rattan on Hand, ready for Immediate Shipment.

McGUIRE-CUMMINGS MANUFACTURING CO.

GENERAL OFFICES
111 WEST MONROE STREET
CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars, Snow Sweepers, Electric Locomotives.



A Regular 100% Exhibit

See The Differential Car in Operation at Chicago

How does one work? Come and see for yourself at our Convention Exhibit. You can operate it yourself.

Will it do the work on your road? You can judge for yourself when you see it in operation at the Chicago Convention.

Not a picture, nor a model, but a full-size Differential Car, fully-equipped and operating, will be there for your most thorough inspection.

Our representatives will be ready to figure with you on the actual cash savings you can accomplish with Differential Cars on—

- Track Construction
- Track Maintenance
- Highway Construction
- Paving Work
- Coal Hauling
- Ash Disposal
- Snow Removal
- Freight Hauling

Study this matter while in Chicago.

The Differential Steel Car Co.
Findlay, Ohio

ACKLEY BRAKES
Found The World Over

The Ackley No-Staff

Dependable
Self-Contained

All Gear Ratios

Powerful
Compact

Eccentric Winding Drum

Above all—QUICK-ACTING

An emergency calls for quick action. Be consistent in your Safety program. The hand brakes on your cars are *not* of the true emergency type unless they can function almost immediately. ***Don't spend those all-too-few seconds in just winding up slack!***

The Ackley No-Staff is the only staffless brake of the quick take-up type. It is light, powerful and compact. It is never in the way of operator or passenger. The hand wheel is 16 or 18 inch, as you prefer.

The Price is only $30.00

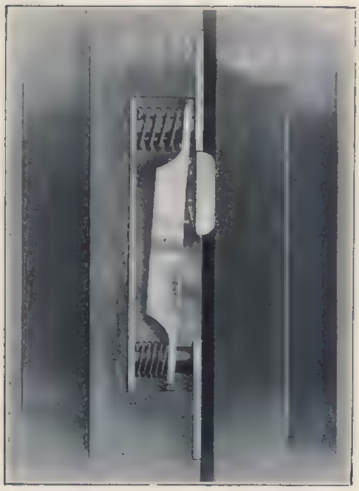
Back Up Your Air Brake with the No-Staff and Be Sure

REPRESENTATIVES:
E. A. Thornwell, Candler Bldg., Atlanta, Ga.
A. W. Arlin, Central Building, Los Angeles, Calif.

ACKLEY NO-STAFF TRADE MARK BRAKE

ACKLEY BRAKE & SUPPLY CORPORATION
G. S. ACKLEY & COMPANY. REPRESENTATIVES
50 Church Street, New York, U.S.A.
Agencies throughout the World
Cable address "Acklebrake"

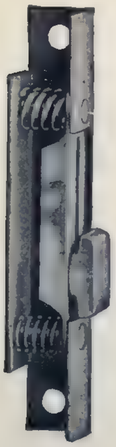
ACKLEY TWO ECCENTRIC TRADE MARK 2-E BRAKE THE ACKLEY COMPANY U.S.A.



EDWARDS

Compression Brake Device Stops Falling Sash

Here is a device that allows sash to be *raised* easily—but automatically *stops* undesired downward movement. Ideal for older cars with loose windows. Now in use on thousands of sash, preventing personal injury and damage to sash frame, glass and sash lock. The springs are of different strengths. The large figure shows the device applied to the sash. It will be noted that the heavy spring is at the top of the device. In raising the sash, the shoe compresses the weaker spring, allowing the sash to be raised with comparative ease, at the same time preventing all rattle. In lowering the sash, the shoe automatically slides to the top and compresses the heavy spring. This increased pressure gives sufficient friction to prevent the sash from falling, and at the same time holds the sash firmly against the outer stops when the window is closed. If preferred, this device can be placed on the edge of the stop casing adjacent to the sash, in which case application is made with the heavy spring at the bottom.



Compression Brake Device A-152

Lift A-177

Lock A-21

Window Fixtures
All Metal Sash Balances
Metal Stop Casings

Metal Extension Platform Trap Doors
and Trap Door Locks
Top, Bottom and Side Weather Stripping

THE O. M. EDWARDS COMPANY, INC.

NEW YORK

Executive Offices and Factory
SYRACUSE, NEW YORK, U. S. A.

CHICAGO

We Invite

- Illuminated Destination Signs
- Steel Gear Cases
- Motormen's Seats
- Faraday Car Signals
- Lighting Fixtures
- Golden Glow Headlights
- Headlight Resistances
- Air Sanders

- Trolley Catchers
- Shelby Trolley Poles
- Rotary Gongs
- International Fare Registers
- Fare Register Fittings
- Samson Cordage
- Air Valves
- Cord Connectors
- Trailer Connectors
- Automatic Door Signals
- Standard Trolley Harps
- Standard Trolley Wheels

with

KEYSTONE

Car Specialties

WE WELCOME the opportunity to show to our electric railway friends again, and present for their examination, the nationally prominent line of Keystone Car Specialties consisting of the items listed in the panel on the opposite page. You will find our Exhibit in Section D, Booths 15, 16, 17 and 18 on the Pier.

This is our invitation for you to come and visit us and look over carefully the products you have read about every week in *Electric Railway Journal.* An examination of Keystone Products at this close range is the next best thing to riding with them on your cars—and we hope, of course, you'll accept our invitation to ride with them. Look every one of them over carefully and you cannot help observing the refinement of workmanship and materials that go into them.

Keystone Car Specialties are designed to enhance the attractiveness of your cars and furnish the conveniences the riders expect to find.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and
Cambria Streets

NEW YORK
50 Church Street

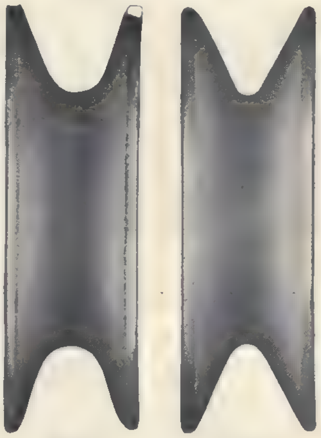
CHICAGO
Monadnock Bldg.

BRANCH OFFICES:
Boston, Scranton,
Pittsburgh

Canadian Distributors:
Lyman Tube & Supply
Co., Ltd.,
Montreal, Toronto,
Winnipeg, Vancouver

Increase Your Transportation Sales

By Increasing the Efficiency of Your Service



“U” “V”

Keep Your Cars Always on Time by Using Bayonet Trolley Equipment

Bayonet Special Trolley Wheels

are made of the very highest grade of metal. No cheap alloys or old trolley wheels recast into new ones. All hand turned, insuring the greatest accuracy and balance. They are known all over the world for their superiority over other wheels, their economical and efficient service having been proved by competitive tests.

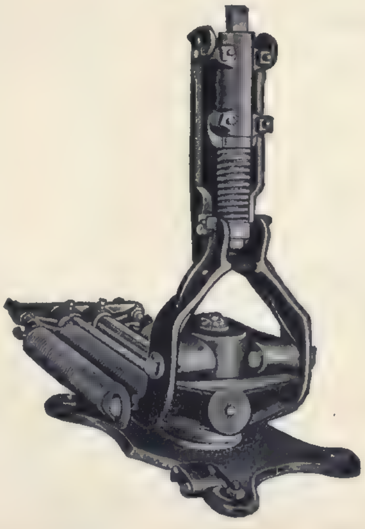
Bayonet Detachable Trolley Harps

are the only trolley harps with which you can change from wheel to sleet cutter or to a new wheel in TEN SECONDS. No tools required on top of the car; only your hand is necessary. All inspections, repairs, adjustments and lubricating are done at the work bench where they are better done. This eliminates unsatisfactory patchwork on top of car, insures perfect running trolleys and increases your trolley wheel mileage at least 33⅓%. The original and only practical Non-Arcing Harp made.

Bayonet Trolley Base with Detachable Pole Clamp

is the only trolley base made on which the trolley pole can be changed in 30 SECONDS and the wheel be in perfect alignment, with the wire, and no tools required to do the job. Greatest flexibility of pole action is afforded by long extension springs, and self-lubricated bushings in bearings, and the roller bearing swivel gives freedom to the rotary motion. It is so constructed that you get a uniform wire pressure at all angles of pole. All wearing parts are quickly and cheaply renewed, making the main parts of the base everlasting.

Perfect conductivity is afforded by sliding contact between turret and base plate. It saves your overhead, your wheels and your wire by its freedom of action.



Bayonet Sleet Cutters

have no superiors in cutting ice from the wire. If the ice can be removed the Bayonet will do the job. We have the rigid and semi-rotary types (the kind you can back up with) both of which are detachable and interchangeable with the wheel. Only ten seconds necessary to make the change from harp with wheel to one with sleet cutter.

All Bayonet equipment sold subject to approval. You must be satisfied or your money will be refunded. Begin now to practice economy by using the Bayonet.

BAYONET TROLLEY HARP CO.
Springfield, Ohio, U. S. A.

Don't Fail to Visit Our Exhibit at the Convention
Booths 15 and 16, Section B

RAILWAY UTILITY COMPANY
141-151 W. 22nd St., Chicago, Ill.

J. H. Denton, 1328 Broadway, New York
F. S. McNamara, 307 Barth Bldg., Denver
Detroit Railway Supply Co., 351 Equity Bldg., Detroit

Meet Us on the Pier at Chicago

We'll show you some Catcher and Retriever Stunts.

Do you use one-man cars with a single pole that has to be reversed? Let us show you.

Have you found your trolley base supports weak? Your Catchers haven't been working.
Let us explain.

Do you find that your Catchers don't take in the rope in wet weather?
Take a look at our Free-winding spring.

Have you had the advantages of the *ratchet wind* for Retrievers explained—or of the *emergency release?*

Do you like to load your cars with eighty pounds of Retrievers when thirty will do the work as well or better?

Call at our Booth C-77 and get the latest Catcher and Retriever tips.

C. I. EARLL, York, Pa.

EARLL

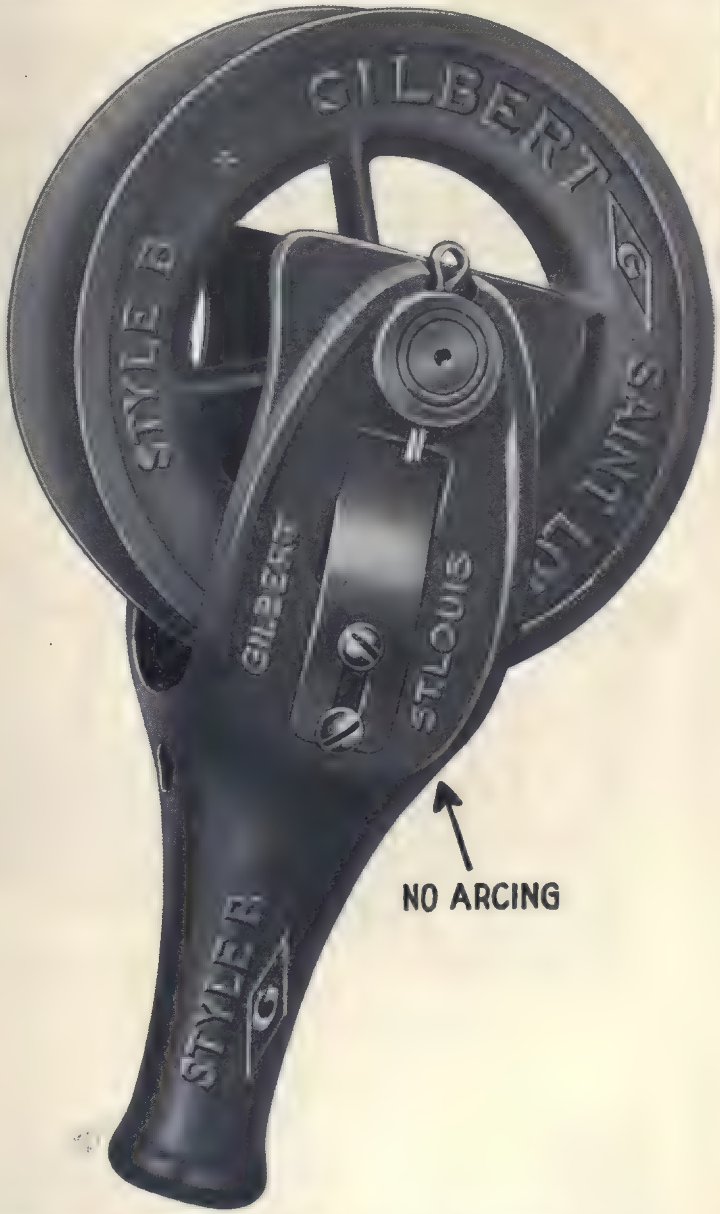
TROLLEY CATCHERS AND RETRIEVERS

WHY NOT?

TRY GILBERT'S STYLE "B" HARP AND TROLLEY WHEEL

The Best and Longest service possible without detriment to overhead lines—

PERFECT BALANCE AND CONTACT



NO ARCING

Alloy, the result of long and careful tests under all conditions.

Also made in standard wheels with Bound Brook bushings.

Cut your maintenance cost with Gilbert Products and put an end to operating deficits.

VELOX BRONZE

For Armature and Axle Bearings

Use Gilbert's "C" Grade Nickel Babbitt Metal

A. GILBERT & SONS BRASS FOUNDRY CO.

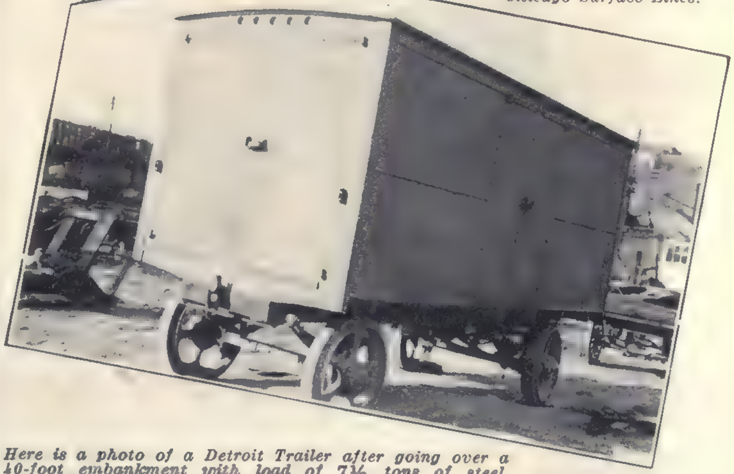
ST. LOUIS, U. S. A.

Haskelite ROOFS

Read these two pages of reasons why Builders and Operators prefer HASKELITE for roofs, ceiling and linings—and PLYMETL for sides.

New Chicago Surface Lines car now operating, Division Street, Chicago.

This car has Haskelite roof and linings. 45 new similar cars ordered by Chicago Surface Lines.



Here is a photo of a Detroit Trailer after going over a 40-foot embankment with load of 7½ tons of steel. Only slight damage to top. Detroit Trailers have PLYMETL sides, roofs, doors, ends and linings.

Street Railways Using HASKELITE and PLYMETL

Chicago Surface Lines
Milwaukee Elec. Ry. & Light Co.
Pittsburgh Railway Co.
New York & Queens County Ry. Co.
Illinois Traction System
Indianapolis St. Ry. Co.
Montgomery Light & Traction Co.
Reading Transit & Light Co.
Interstate Public Service Co.
Public Service Railway Co.
Harrisburg Railways Co.
Municipal Rys. of San Francisco
Columbus Railway Co.
Denver Tramway Company
Grand Rapids St. Ry. Co.
Cataluna Railway Ltd., Spain
New York & L. I. Traction Co.
Cincinnati Traction Co.

CAR BUILDERS

G. C. Kuhlman Car Co.
National Safety Car & Equip. Co.
Cincinnati Car Co.
St. Louis Car Company
American Car Company
J. G. Brill Co
McGuire Cummings Mfg. Co.

Plymetl SIDES

See our exhibit at the A.E.R.A. Convention, Booth No. 65, Section D, October 2-6. FREE samples of Haskelite and Plymetl sent on request.

An amazing demonstration of the supreme qualities of PLYMETL, the steel faced HASKELITE, was furnished recently when by accident a trailer belonging to the Detroit Trailer Company, and carrying 7½ tons of steel, fell over a 40-ft. embankment. Here is what J. B. Mansfield, Pres. and G. M. says:

> *"The only damage done was to the top of the trailer, about $50.00. The material inside the trailer was not damaged. Had this been the ordinary type of body, the cargo would have been a total loss and the body would have been completely smashed, as there have been several trucks that have gone over this embankment, requiring thousands of dollars to place in shape. We simply removed the top and the trailer continued in service until we could get a job to replace it. We know of nothing that we could say that would be too strong for Plymetl when it comes to standing abuse."*

Plymetl Sides Give Greater Strength—Less Weight

What better proof of quality than the above could be asked for Plymetl? Many companies are specifying Plymetl and many builders use it exclusively in the Bus field. The steel faces are economical to finish. The wood layers provide protection against heat and cold. Weight for weight, Plymetl is much stronger than steel and more resistant to abuse.

Before Plymetl was put on the market, it was tried out thoroughly by weathering tests. Hundreds of square feet have been exposed to the action of sun, rain and cold for long periods of time without any of the material showing signs of deterioration.

Haskelite Roofs Are More Attractive and Substantial

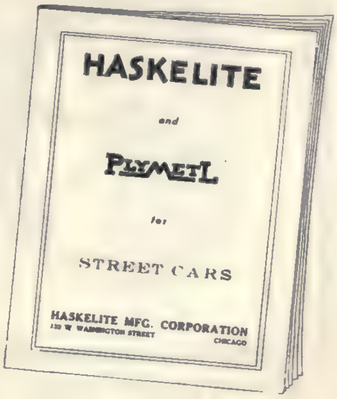
In the same way that Plymetl has proved its value for sides, Haskelite has won the leading place as construction material for roofs, ceilings and linings. A Haskelite roof does more than protect against the weather. It is the most attractive roof made, and one of the most substantial. Tests have shown that Haskelite roofs will carry the weight of seven or eight men. The Chicago Surface Lines have just placed a contract for sufficient Haskelite to build 45 cars like the one shown in the illustration.

Ask for the FREE Blue Print Booklet

Every company executive and car builder is invited to inspect our Exhibit of Haskelite and Plymetl at Booth No. 65, A. E. R. A. Convention.

We have also prepared a special blue print booklet giving the combined experience of builders and companies, with photographs and diagrams of interest to everyone in the electrical railway field.

Write for this booklet today—it is FREE for the asking.



HASKELITE

and

PLYMETL

for

STREET CARS

HASKELITE MFG. CORPORATION
133 W. WASHINGTON STREET
CHICAGO

HASKELITE MFG. CORPORATION

133 W. Washington St., Chicago, Ill.

Kalamazoo

trolley wheels and harps

THE VERY FACT that Kalamazoo Trolley Harps and Wheels are made by the largest concern of its kind in the World is in itself an indication of their standard.

Our products are made in a shop devoted exclusively to these specialties. Today we are supplying the major part of the entire demand of the United States. There must be a reason for this and there *is*. And that is, a high reputation due to high quality.

Kalamazoo Trolley Harps and Wheels have been endorsed by the leading electric roads since their inception on the market, over 25 years ago.

Kalamazoo Harps give perfect and continuous contact, and are designed to permit easy replacement of wheels. There is only one cotter pin to be taken out to remove the wheel.

They are balanced for easy running and freedom from slippage. They do not wear down and damage the wire, for wire life is more important than wheel life.

Kalamazoo wheels are made of virgin metal—pure lake copper—they are of proper design for the intended service, and are honestly manufactured.

Our Exhibit will be found at Space 71, Section C, Municipal Pier, Chicago

STAR BRASS WORKS

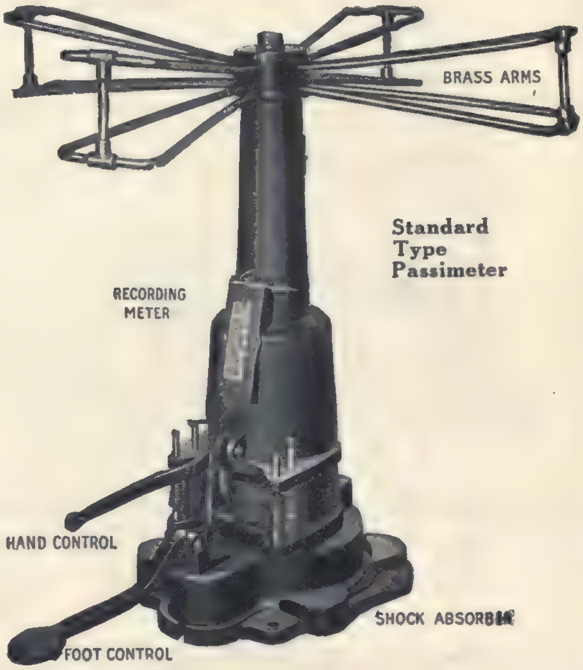
Kalamazoo, Michigan

The largest exclusive manufacturers of trolley wheels in the world

Perey Passimeter and Turnstiles

for Every Purpose

Automatic Type Passimeter



Standard Type Passimeter

**Practical
Durable
Substantial**

No. 10 Turnstile

"A man should never do the work that a machine can do for him."

Let Perey Machines Register Your Fares and Give You an Exact Count of All Passengers.

Perey Car Turnstile

**Accurate
Efficient
Reliable**

Perey Manufacturing Company, Inc.
30 Church Street, New York City

See Our Exhibit in Booth No. 44—Section "D" at
Annual A.E.R.A. Convention, Municipal Pier at Chicago.

RELIABLE BRUSHES

for electric traction

RAILWAY MOTOR BRUSHES

NCC COLUMBIA 203

Grade 203, produced by research and proved by test, the most satisfactory and lowest cost-per-car-mile brush obtainable for A. C. commutator type railway motors. One of a series of standard railway motor brushes.

COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

RAILWAY MOTOR BRUSHES

NCC COLUMBIA 402

Grade 402 has been proved by test the most economical and satisfactory brush for standard slotted commutator railway motors in both city and interurban service. One of a series of standard railway motor brushes.

COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

RAILWAY MOTOR BRUSHES

NCC COLUMBIA 812

Grade 812 has been proved by test the most economical and satisfactory brush obtainable for standard flush or slotted commutator railway motors in local or moderate speed interurban service. One of a series of standard railway motor brushes.

COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISC

RAILWAY MOTOR BRUSHES

NCC COLUMBIA 407

Grade 407 is universally recognized and adapted as the premier compressor motor brush on standard railway systems. One of a series of standard railway compressor motor brushes.

COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

For description of our full line of brushes write for Catalogue No. 37

NATIONAL CARBON COMPANY, INC.

Cleveland, Ohio San Francisco, Calif.

ULCO BRAND-

Rolling Stock

Kentucky Traction & Terminal Company, Lexington, Ky., purchased ten cars from the Cincinnati Car Company, as announced in the ELECTRIC RAILWAY JOURNAL for Feb. 4, 1922. Additional details regarding the equipment and size of these cars are now available as follows:

Number of cars ordered	10
Name of road	Kentucky Traction & Terminal Company.
Order placed	October, 1921
Delivered	February, 1922
Builder of car body	Cincinnati Car Company.
Axles	Cincinnati Car Company A.S.T.M. specifications.
Bumpers	Cincinnati Car Company 6 in. channel.
Car signal system	Faraday 4-V, Edison battery.
Car trimmings	Cincinnati Car Company oxidized brass.
Center and side bearings	Cincinnati Car Company friction.
Control	General Electric, K-35, H.H.
Couplers	Cincinnati Car Company stationary pocket.
Curtain fixtures	Curtain Supply Company, protected groove
Curtain fixtures	Curtain Supply Company, pantasote-J.
Designation signs	Electric Service Supply, Keystone I. L. R.
Door operating mechanism	Safety Car & Equipment Company.
Fare boxes	None
Fenders or wheelguards	Cincinnati Car Company pilot.
Gears and pinions	General Electric grade M.
Hand brakes	Cincinnati Car Company
Heater equipment	Holden & White C.H. type.
Headlights	General Electric Company J-12, 500 watt.
Journal bearings	**United Lead Company (Frary metal), M.C.B.**
Journal boxes	Symington M.C.B., 3 x 6
Lightning arresters	General Electric Company aluminum cell.
Motors	General Electric 264, four per car
Motors	Inside hung
Paint	Acme white lead and color
Registers	Cincin
Sanders	
Sash	

Ulco Brand—Frary Metal Bearings

The Specifications **The Service**

In January and February, 1922, the Kentucky Traction & Terminal Company at Lexington, Ky., received from the Cincinnati Car Company ten new lightweight double-truck cars weighing 25,100 lb. completely equipped. Ulco brand Frary metal journal and motor axle bearings were specified to be furnished with the new equipment, and this company, I believe, was the first to specify this material in both journal and motor axle bearings on new equipment. To date we have operated 327,282 miles and have not had a single failure in any instance, either in broken or hot bearings. These cars are averaging about 7,200 miles per car per month with a lubrication cost of 4.3 cents per 1,000 car-miles, all of which, in my opinion, speaks well for Ulco brand Frary metal bearings.

W. G. STUCK,
Master Mechanic.

—from Electric Railway Journal, July 22, 1922; page 138.

Write us. We shall be pleased to supply you with more information about Frary Metal Bearings.

UNITED LEAD COMPANY
111 Broadway, New York, N. Y.

-FRARY METAL

MILLER TRO

See a Practical Demonstration on the

"Meet every requirement

For over six years the Chicago, North Shore and Milwaukee R. R. has used Miller Trolley Shoes.

Take a ride on one of these trains. They leave every hour on the hour and run at 80 miles per hour. This railroad boasts of its speed. And Miller Trolley Shoes keep their trolleys on the wire—several motor cars in a train each having its own trolley up. Notice, too, the absence of flickering lights at night proving constant contact.

Miller Trolley Shoes will be exhibited at the A.E.R.A. Con

MILLER TROLLEY SHOE CO

LLEY SHOES

Chicago, North Shore & Milwaukee R. R.

for increased efficiency"

1. The pantagraph applied to the trolley car.
2. Better current collector.
3. Fewer dewirements.
4. Noiseless.
5. No lubrication.
6. Less wear in trolley wire.
7. More miles per dollar.

vention by the Economy Electric Devices Co., Space 17-18 Section F

MPANY, BOSTON-21, MASS.

TIGHTEN UP!

You won't have to when you
use automatic

S-W Brake Slack Adjusters

The ordinary method of adjusting brakes in the barn is unsafe. The human element is too far involved. And it lengthens the task of inspection and increases the expense of maintenance.

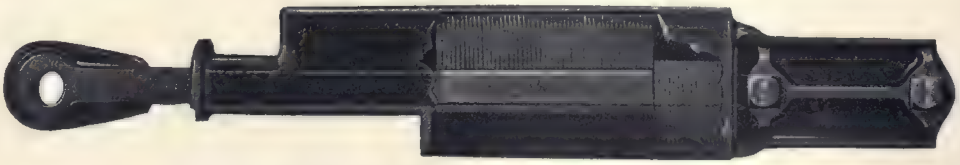
S-W Brake Slack Adjusters correct these evils and in addition impart longer life to your brake shoes by evenly distributing the wear at each point of contact.

Don't trust slack correction to the motormen and barn crew.

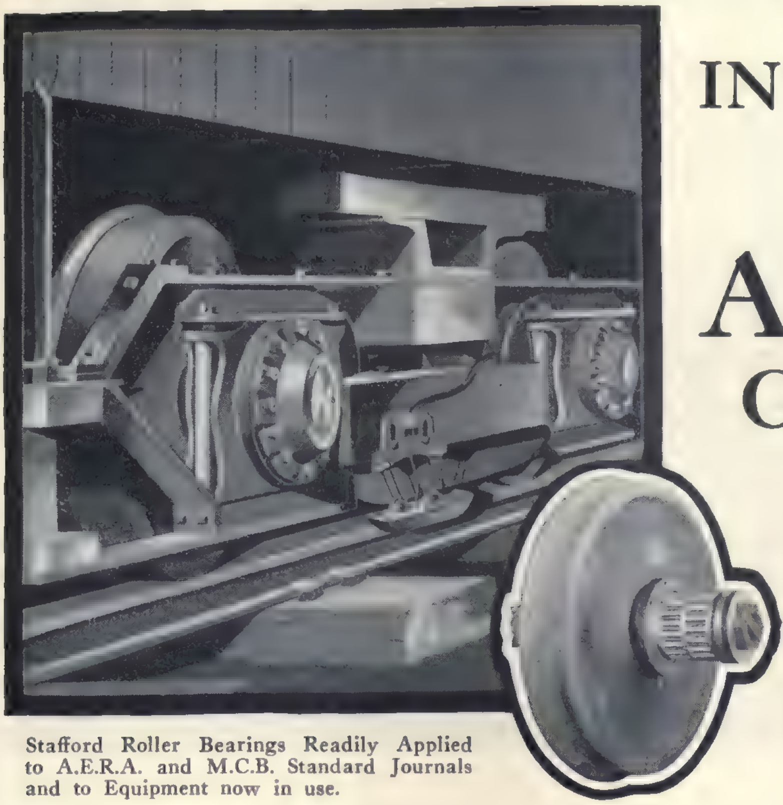
Remove it altogether and be assured of dependable braking.

S-W Brake Slack Adjusters will fit any trucks. Try them.

SMITH-WARD BRAKE COMPANY
233 Thirty-seventh St., Brooklyn, N. Y.



Stafford
ROLLER BEARING



Stafford Roller Bearings Readily Applied to A.E.R.A. and M.C.B. Standard Journals and to Equipment now in use.

INVESTIGATE
it at the
A-E-R-A
Convention
Section B.
Space 68
and
Exhibit Track

THE PRACTICAL ROLLER BEARING THAT CUTS POWER REQUIREMENTS IN HALF

During the A. E. R. A. Convention Stafford Roller Bearings for Railroad and Railway Car Journals will be demonstrated daily in Section B—Space 68.

We want to show every visitor how these mechanically correct bearings eliminate journal friction, and thereby cut power requirements in half, increase capacities, prevent hot boxes and end lubrication difficulties.

THE FAMOUS TEST CAR WILL BE THERE

On the Exhibit Track you will find Michigan Central Box Car No. 48350 equipped with the original test bearings that have been in continuous service on the Michigan Central Railroad since October 15, 1920, and still show no signs of wear or depreciation.

Push the car yourself. See how easy it is for one man to move it from a dead start. Then translate your experience into terms of power saving.

Stafford Roller Bearings are Guaranteed for Two years From Date of Application, and They Should Outlive Their Guarantee by Ten Years.

STAFFORD ROLLER BEARING CAR TRUCK CORP'N.
LAWTON, MICH.

H-B LIFE GUARDS

6340 H-B Life Guards on Chicago Surface Cars

100% H-B Equipped

Every one of the 3170 motor passenger cars owned by the Chicago Surface Lines has a set of H-B Life Guards on each end. Jockeying through the crowded crossings of the "Loop," or speeding along suburban streets, the utmost protection for human life and limb has been provided, when cars are supplied with H-B Life Guards.

See H-B Life Guards on Every Car in Chicago

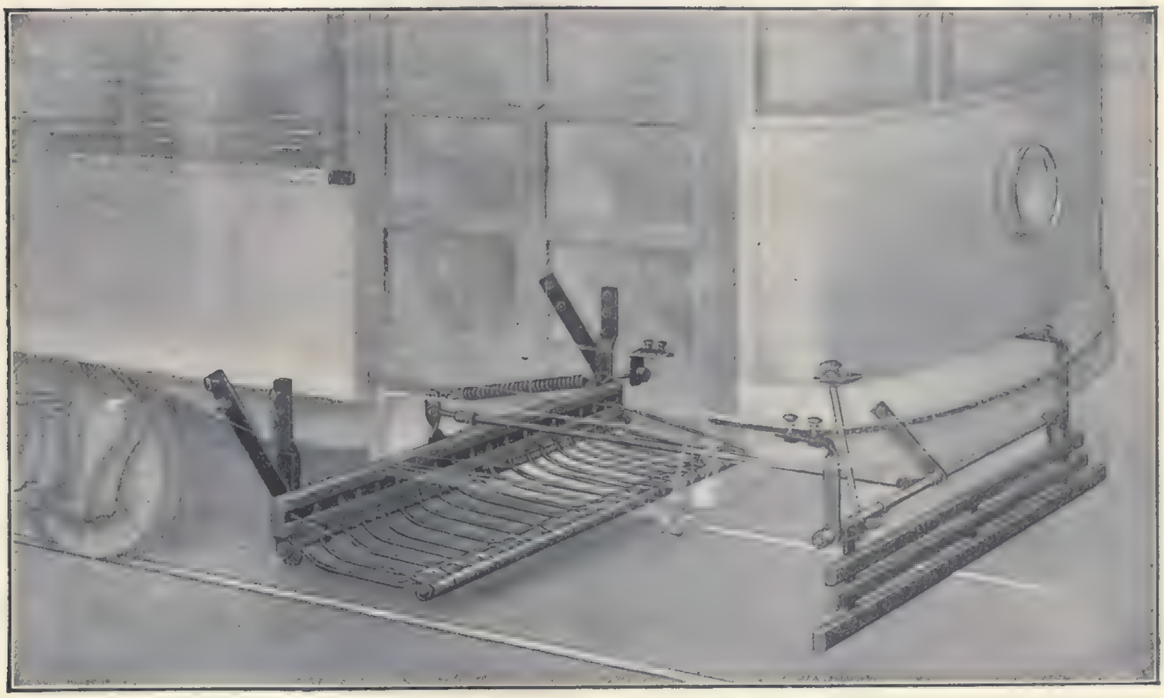
Providence Fenders

CONSOLIDATED CAR FEN

General Sales Agents: **Wendell &**

Again We Lead!

Note Our Improved Life Guard



Providence Type H-B Life Guard

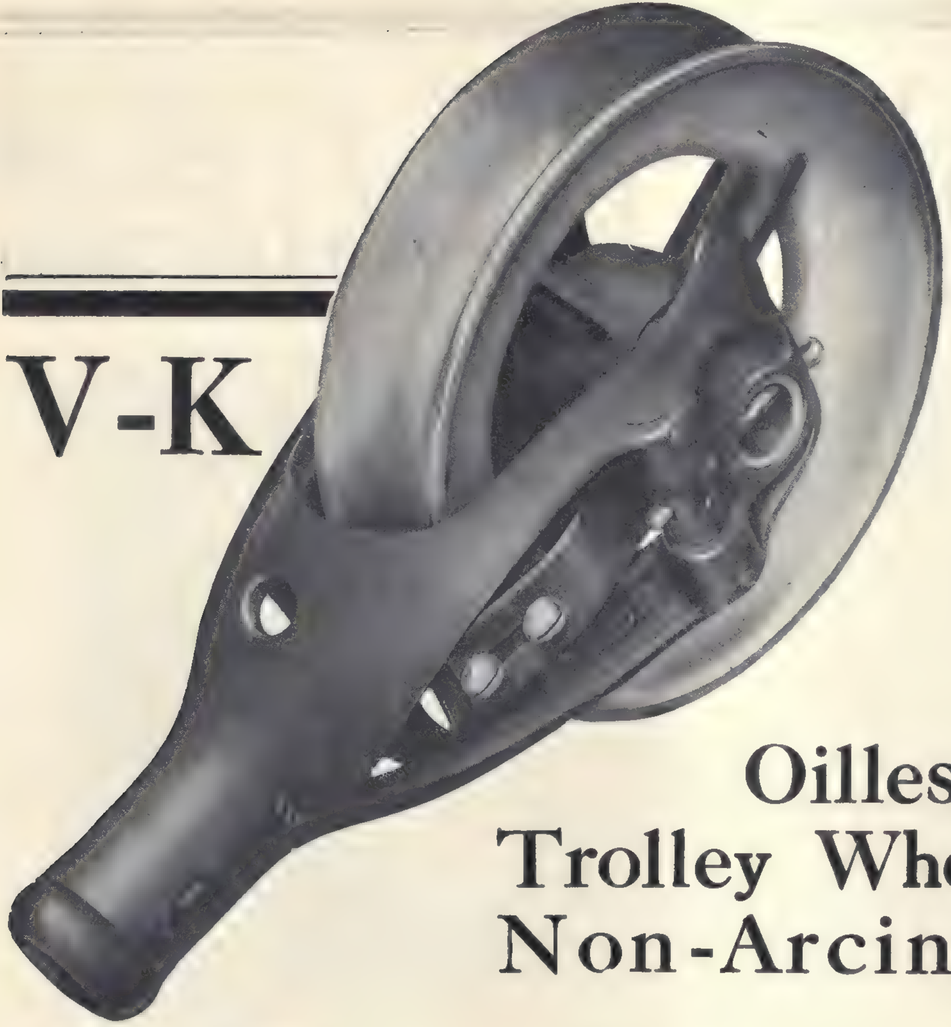
The carrier or basket is interchangeable with the present H-B Life Guards you have.

Lowers Maintenance Cost
Strong—Efficient—Positive
Instantaneous in Action

DER CO., Providence, R. I.
MacDuffie Co., 61 Broadway, N. Y.

Keep

V-K



Oilless Trolley Wheels And Non-Arcing Harps

Ask the motorman at the controller! He knows the difference when the car is equipped with V-K Oilless Trolley Wheel and Harp. He likes that even, wasteless flow of power—that feeling that everything is right—which he gets with this equipment.

V-K Oilless Trolley Wheels and Harps are the one correctly made trolley wheel and harp. The metal of the wheel is soft enough to prevent wear on wires yet tough enough to maintain perfect contour and smooth wire-contact in the groove. This means maximum conductivity.

The patented oilless graphite and bronze gauze bushings are non-insulating, heat-proof and easily interchangeable. The patented gripping device in the V-K harp insures perfect contact between harp and axle pin.

Write and let us tell you further just *WHY* V-K oilless trolley wheels and harps are most economical, because most efficient, on the market.

More-Jones Brass & Metal Co.

More-Jones

The Cars "In Service"

"Tiger" Bronze Bearings

Keep a larger percentage of your cars in daily service—that's where the use of "Tiger" Bronze Axle and Armature Bearings affect you. They *last* longer, that's their story in a nut-shell. They keep the car in service long after a car with inferior bearings is laid up for bearing replacements and possibly rewinding of armature coils.

"Tiger" Bronze Bearings are of exceptional toughness. Their unusual anti-frictional qualities cause them to wear down slowly and evenly, maintaining correct alignment at all times. They save wear on both journals and axles.

Such Bearings are most economical in the long run. Judging the cost, per mile of service, they are the least expensive of all axle and armature bearings.

It will pay you to investigate "Tiger" Bronze Bearings as well as to learn of the engineering service that goes with them.

Trolley Wheels

V-K Oilless
M-J Lubricated

Harps

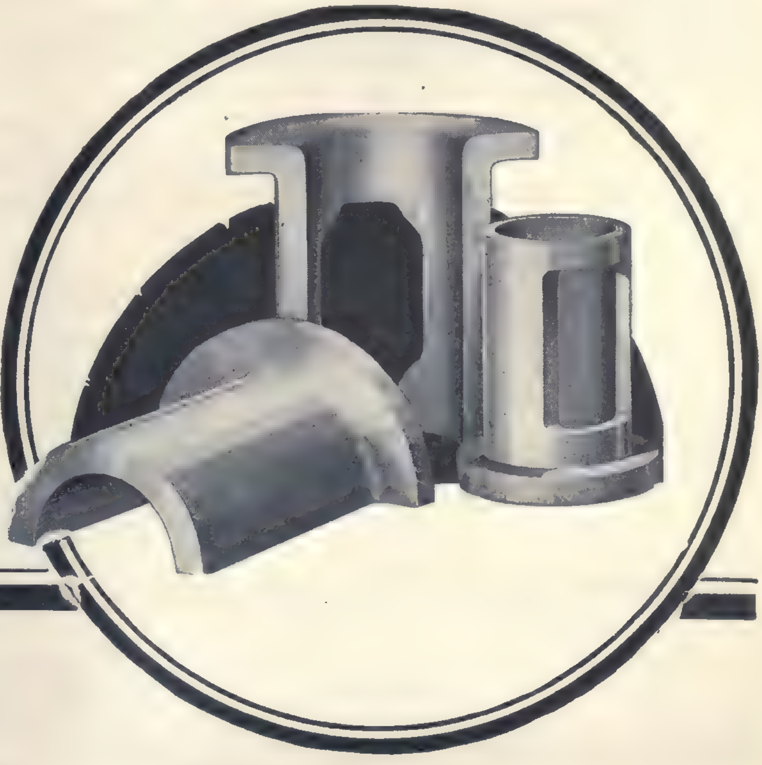
V-K Non-Arcing

Bearings

"Tiger" Bronze
Axle and Armature

Armature Babbitt

and similar products



St. Louis, Mo.

Products

Hold a BOYERIZED Convention in Your Car Pits!

How many "conventions" per year do your pitmen hold when it comes to replacing the worn pins and bushings in your brake riggings? Well — by holding a Boyerized Convention in the near future you can be certain of holding three or four times FEWER such replacement conventions in the future for years and years to come!

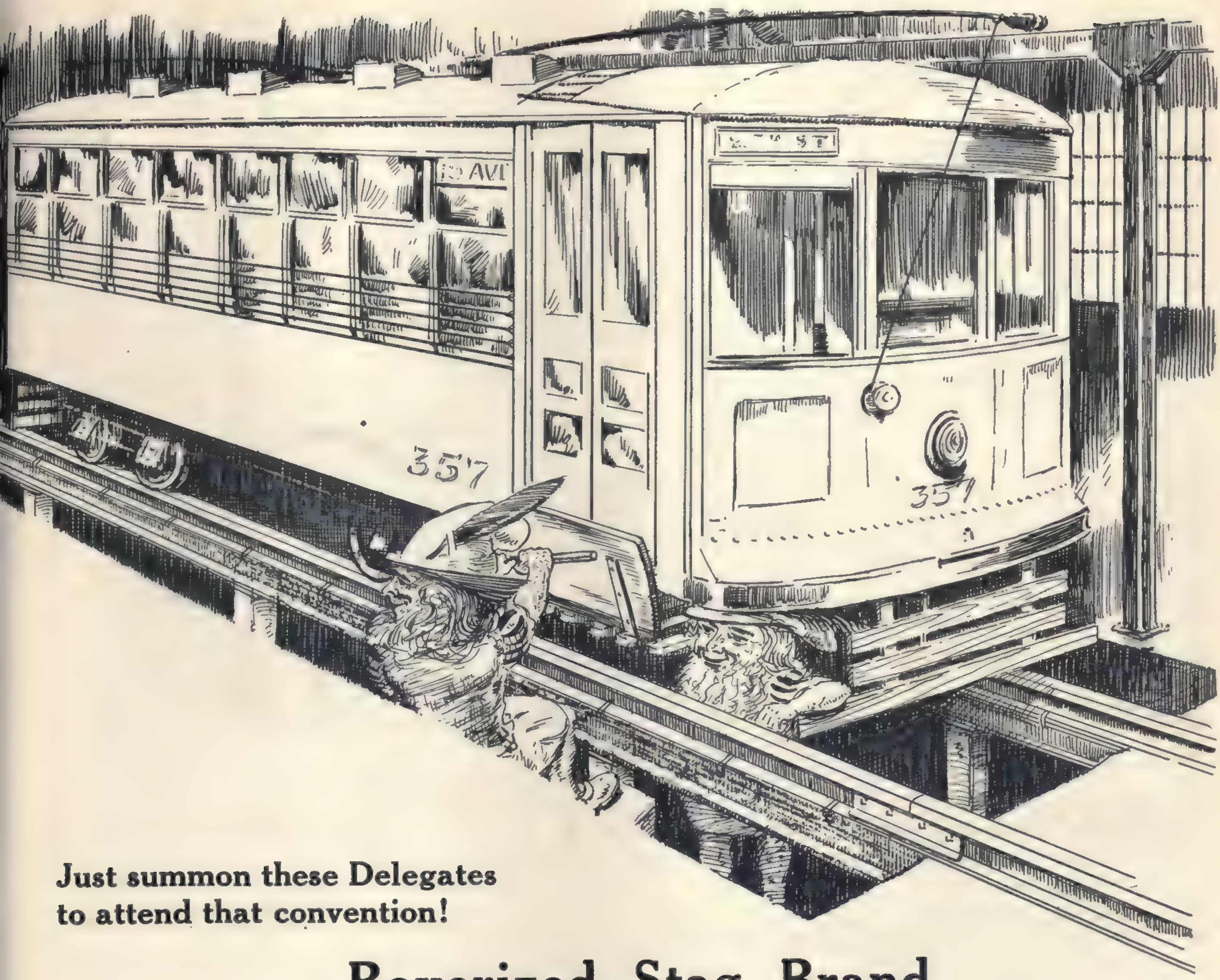
And what's more—you'll find that your Boyerized Pins and Bushings will save their own cost many times over in longer life and lessened lost motion.

All the Boyerized Products should go to that pit convention—because ALL of them are made with the same object—more mileage—less brake troubles—less maintenance—less cost in the long run. So —summon the delegates and let us send you the facts about what each one has done and will do.

BEMIS CAR

Springfield,

REPRESENTATIVES:
Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.



**Just summon these Delegates
to attend that convention!**

Boyerized Stag Brand Manganese Brake Heads

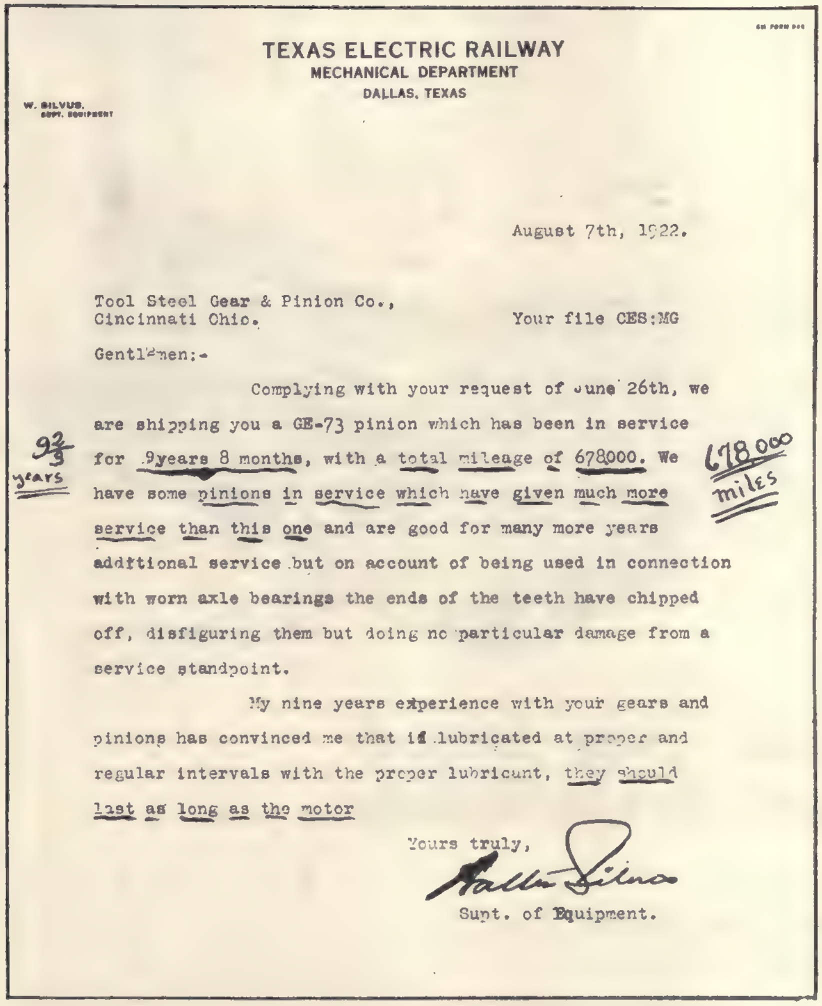
- **Bemis Trucks**
- **Case Hardened Brake Pins**
- **Case Hardened Bushings**
- **Case Hardened Nuts and Bolts**
- **Manganese Brake Heads**
- **Manganese Transom Plates**
- **Manganese Body Bushings**
- **Bronze Axle Bearings**

TRUCK COMPANY

Massachusetts

J. H. Denton, 1328 Broadway, New York City, N. Y.
W. F. McKenney, 54 First Street, Portland, Oregon
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

T. S. Q. means this



TEXAS ELECTRIC RAILWAY
MECHANICAL DEPARTMENT
DALLAS, TEXAS

W. SILVUS,
SUPT. EQUIPMENT

August 7th, 1922.

Tool Steel Gear & Pinion Co.,
Cincinnati Ohio.

Your file CES:MG

Gentlemen:-

Complying with your request of June 26th, we are shipping you a GE-73 pinion which has been in service for 9years 8 months, with a total mileage of 678000. We have some pinions in service which have given much more service than this one and are good for many more years additional service but on account of being used in connection with worn axle bearings the ends of the teeth have chipped off, disfiguring them but doing no particular damage from a service standpoint.

9⅔ years

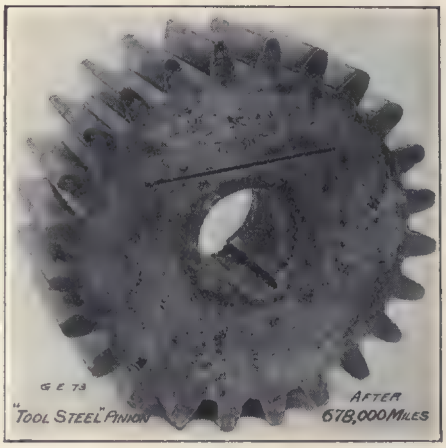
678,000 miles

My nine years experience with your gears and pinions has convinced me that if lubricated at proper and regular intervals with the proper lubricant, they should last as long as the motor

Yours truly,

Walter Silvus

Supt. of Equipment.



and he says "We have some pinions in service which have given much more service than this one and are good for many more years."

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

A. E. R. A.
Standard Patterns
BRAKE HEADS
BRAKE SHOES
BRAKE SHOE KEYS
Reinforced Diamond "S" Brake Shoe
BEST TYPE
SAFETY EFFICIENCY ECONOMY
CHICAGO CONVENTION

Visit our Exhibit

Sections F11-12

American Brake Shoe and Foundry Company
30 Church Street, New York
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PLANTS:
Norwood, Mass.
Mahwah, N. J.
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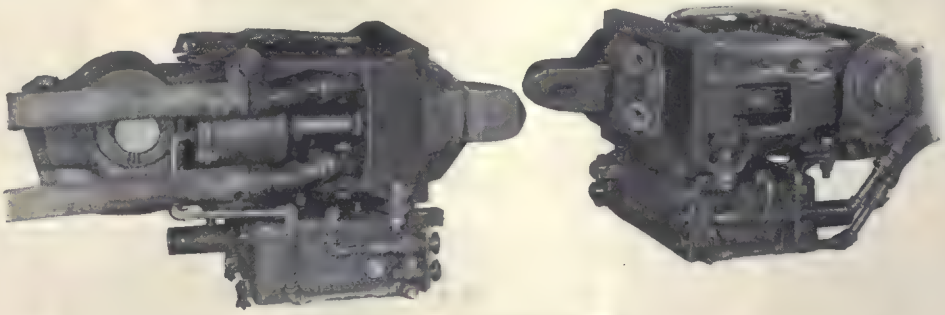
Los Angeles, Cal.
Chicago, Ill.
St. Paul, Minn.
Denver, Colo.
San Francisco, Cal.

For Superior Service—

Van Dorn Car-Air-Electric Couplers



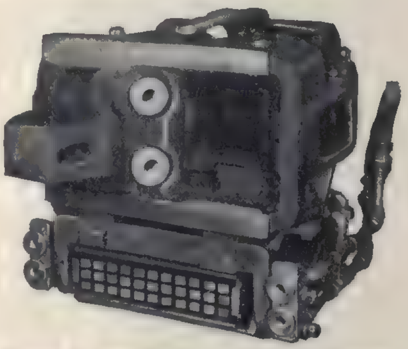
Practical time-and-labor savers

Uncoupled or train end position

THE Van Dorn "Tight Lock" maintains leak-proof air connections and proper registration of electric contacts.

POSITIVE alignment of car couplers protects the electric members in coupling.

VAN DORN Couplers are time-and-labor-saving devices—and safety of operation has been of prime importance in their design.



Showing "coupled" position of electric member

VAN Dorn Car-and-Air Couplers effect automatically an unyielding coupling of cars, air lines and electric circuits. Maintenance cost is reduced to the minimum by simplicity of construction and the rigid locking principle which practically eliminates wear on coupling surfaces and locking parts.

Van Dorn No. 1050 Car-Air-Electric Couplers in coupled position

"Meet us on the Pier"—Booths 45 and 46—Section C.

Van Dorn Coupler Company

2325 South Paulina Street, Chicago, Illinois

Users of rolled steel wheels, gear blanks etc. will find our exhibit at the American Electric Railway Convention, Chicago, October 2nd to 6th, one of unusual interest

Look for space numbers E-19-20-21-22

12,000 Ton Hydraulic Forging Press used for First Forging Operation in the Manufacture of Rolled Steel Wheels.

MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY

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Boston
Chicago
Cincinnati
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General Offices
Widener Building Philadelphia, Pa.

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Pittsburgh
San Francisco
Salt Lake City
Seattle
St. Louis
Washington, D.C.

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege if not the practice of all modern manufacturers."—*Vauclain.*

The Standard Steel Works Company's products are always dependable....They are made to provide long and reliable service under all operating conditions.

Roads desiring to attain the most economical maintenance with efficient service available at any time, are users of our products....Eventual economy is not realized when first cost alone is considered....

Steel Tires

Steel Tired Wheels

Solid Forged and Wrought Steel Wheels

Rolled Steel Gear Blanks

Steel Axles

Steel Springs

Steel Forgings

Steel and Malleable Iron Castings

Rolled Steel Rings

Steel Crusher-Rolls and Shells

Steel Pipe Flanges

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

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LONDON, ENGLAND
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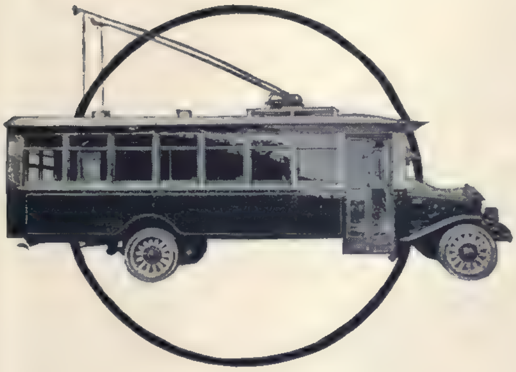
WORKS: BURNHAM, PA.

St. Louis Cars



are

SAFETY CARS

St. Louis "Quality" Assures That

Not by safety devices alone, but by the sterling grade of materials, and most expert and careful workmanship which enter into their construction, are St. Louis Built Cars so thoroughly reliable under all operating conditions.

Whether in the high-speed interurban railway car, the new double truck Universal Safety Car, the trackless trolley or the Standard Safety Car itself, you can count on that same St. Louis Quality which has built up the reputation now coupled with our thirty-three years service to the transportation industry.

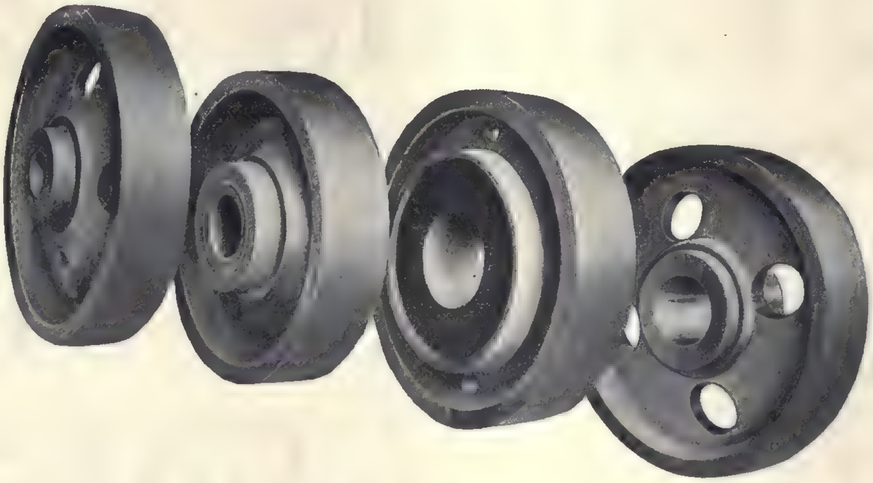
and St. Louis Equipment is SAFE EQUIPMENT

Platform Brakes
Car Forgings
Car Castings
Commonwealth Cast Steel Trucks
Car Seats and Curtains

See our car exhibit, A. E. R. A. Convention, Booth B66.

Or write us for further particulars.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"



CARNEGIE
Wrought Steel
GEAR BLANKS

The Standard Blank from which Railway Motor Gears are cut. Leading Gear Cutters carry Carnegie Blanks in stock.

Steel Cross Ties
Rails and Track Accessories

Street railway track properly laid with steel cross ties demonstrates the wisdom of this construction.

Carnegie Steel Company is ready at all times to consult with you and will cooperate toward the proper working out of any of your re-construction or maintenance plans.

Carnegie Steel Company

GENERAL OFFICES: CARNEGIE BUILDING, PITTSBURGH, PA.

You are cordially invited to inspect our exhibit of Gear Blanks, Cross Ties, etc. at the A. E. R. A. Convention.

Spaces E-5-6-7-8.

1571

One-Man Safety Cars Cut Expenses and Make Money

Let Us Convert Your Present Equipment

One-Man Safety Cars have made good! Over four hundred companies, large and small, now declare them the best money-makers the electric railway industry has yet developed. They have found the One-Man Safety Car a direct saving in labor, a means of speedier and more frequent service, a saving in power, with much lessened wear and tear on tracks and rolling stock.

We Convert Your Cars

Let us help you to equip *your* lines with the One-Man Safety Units. We contract to convert your old cars, in your own shops. We gladly furnish estimates. We rebuild your present equipment, converting them into modern safety cars with complete safety appliances and for one or two-man operation.

175 For B. R. T.

Last year we converted 50 cars to one-man operation for the Brooklyn Rapid Transit Co. After putting these cars to every test the B. R. T. is so pleased with them, they have asked us to convert 175 of their cars to Safety Cars for one or two-man operation.

As in the past we are always ready to be of service to facilitate the use of Safety Cars, whether in appearing before legislative committees, city councils, state commissions or labor organizations—

Or to facilitate the purchase or conversion of cars.

National Safety Car & Equipment Co.

Our Organization

Geo. H. Tontrup, President
E. T. Bronenkamp, Vice-President
C. W. Rhoades
Thos. Simons

St. Louis, Mo.

Eastern Representatives:
National Railway Appliance Co.
(Hegeman & Castle)
452 Lexington Ave., New York
Southeastern Representative:
Atlanta, Ga.
E. A. Thornwell

We Represent

Cincinnati Car Company
Safety Cars

Hale & Kilburn Corporation
Car Seats

"We'll Meet You on the Pier"

And Will Have With Us, For Your Inspection

Fare Boxes
Zone Check Boxes
Change Making Devices
Coin Counting Machines
Coin Separating Machines
Coin Wrappers

Booth 48, Section F.

CLEVELAND FARE BOXES
always
Fit the Fare and Fare Collection System

The Cleveland Fare Box Co.

CLEVELAND OHIO

Canadian Cleveland Fare Box Co., Ltd.

Preston Ontario

The Peter Smith Heater Co.

Hot Water and Forced Ventilation

Hot Air Heaters for All Types
of Electric Railway Cars

Efficient Economical

Call on us at Booth 15 and 16 Sec. F.

Detroit, Mich. Walkerville, Ont.

Amasi

The Kaffir woman's method of weaning her baby is unique.

Step number one is to make his accustomed lunching place undesirable, so she smears her breasts with the intensely bitter juice of the *ikala* plant.

Step number two is to furnish a substitute in the form of *amasi,* or sour milk, which usually requires forcible feeding—the infant is laid on his back and the stuff is *funneled* into him until his tummy resembles a miniature blimp. Then his mother eases him by rolling him over her knee until he feels better!

Weaning an operator from the bad habit of using carbon brushes of any old composition, regardless of the class of work the motor must perform, is not such a painful process.

It is so easy to demonstrate that our substitute is better!

The many forms of Morganite Brushes are each *prescribed* by engineers whose judgement is backed by years of research and experience.

Morganite Brushes *fit!*

Morganite Brush Co., Inc.

Main Office and Factory:
519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia
Electrical Engineering & Mfg. Co., 909 Penn. Ave., Pittsburgh
J. F. Drummey, 75 Pleasant St., Revere, Massachusetts
W. R. Hendey Co., Hoge Bldg., Seattle

Herzog Electric & Engineering Co., 150 Steuart St., San Francisco
Special Service Sales Company, 502 Delta Bldg., Los Angeles
Railway & Power Engineering Corporation, Ltd., 131 Eastern Ave. Toronto, Ontario, Canada

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Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Islands in the Indian Ocean. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

SALES OFFICES:
Heywood-Wakefield Co., 516 West 34th St., New York.
Heywood-Wakefield Co., 1415 Michigan Ave., Chicago.
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
Railway and Power Engineering Corp., Toronto and Montreal.
G. F. Cotter Supply Co., Houston, Texas.

THE Difference in Advertising Is the Difference in Men

The differences in advertising are the differences which exist in men.

Just as some men are strong and virile and interesting, so is some advertising. And just as some men are ineffectual and weak and boring, so is some other advertising.

"Does it pay to advertise?" It pays those men who are keen enough students of their public to make it pay them. It pays those men who are truthful, sincere, interesting and believable.

It pays the men whose product deserves the payment, whose brains are keen enough to organize for success and judge enough of the human mind to know how to tell their story with sincerity and interest.

Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies

THERE'S A GOLD ELECTRIC HEATER
For Every Individual Requirement

For the
Conservation of Current
GOLD'S THERMOSTAT CONTROL
HAS NO EQUAL

BOOTH
48-B

For the
Eduction of Foul Air
GOLD'S CYCLONE VENTILATORS
ARE SUPREME

GOLD CAR HEATING & LIGHTING CO.
220 36th St. (Bush Terminal) Brooklyn, N. Y.

Waterproofed Trolley Cord

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER
SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

"POSITIONS VACANT"

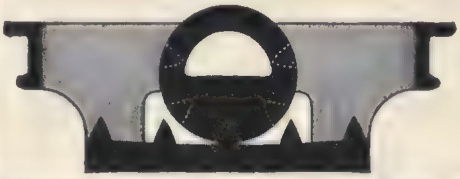
Good jobs appear under this heading in the

"SEARCHLIGHT SECTION"

EMPLOYERS! *Use* these columns for good men.

MEN! *Consult* these columns for good jobs.

8 cents a word. *Minimum $2.00 an insertion.*
0130



STUCKI
SIDE
BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

Car Seating, Broom and Snow Sweeper
Rattan, Mouldings, etc.

AMERICAN RATTAN & REED MFG. CO.
Brooklyn, N. Y.

AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION

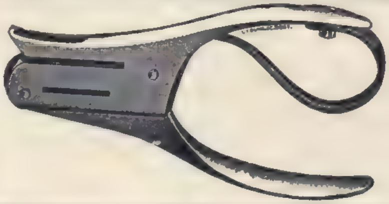
The Rex-L Turnstile
Model 50

Positive, tamper-proof, registering device. Individual release for each person. Conforms to U. S Internal Revenue Department Rules. Used by Boston Elevated Railway Company.

Write us for consultation

DAMON-CHAPMAN COMPANY
Rochester, N. Y.

UNIVERSAL
SAFETY TREAD COMPANY
40 COURT ST., BOSTON, MASS.



A Style for
Every Service

Send for Catalog

BONNEY-VEHSLAGE
TOOL CO.
Newark, N. J.

N-L

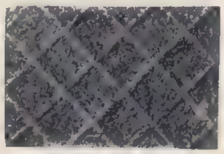
Indicating Signals
Mechanical Sanders
Ventilators, Smokestacks
Pneumatic Sanders
Selector Switches, Lanterns, etc.

THE NICHOLS-LINTERN CO.
8404 Lorain Ave., Cleveland, Ohio

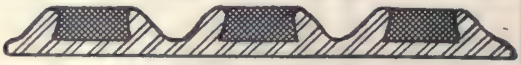
FERALUN Anti-Slip Treads

Car Steps
Floor Plates
Station Stairs
Door Saddles, etc.

AMERICAN ABRASIVE METALS CO.
50 Church St., New York City



It's iron and emery cast together



Any width, with or without nosing

MASON SAFETY TREAD
for car and station steps
Standard for 15 years
Stanwood Steps and Karbolith Flooring
American Mason Safety Tread Co., Lowell, Mass.
Branch offices in New York and Philadelphia
Joseph T. Ryerson & Son, Chicago, Western Distributer

SEE OUR
CATALOGUE
IN
SWEET'S

R. H.

TAYLOR REDUCED HEIGHT TRUCK

WITH

S. A.

TAYLOR STRAIGHT ACTION BRAKE

SMOOTH RIDING

LOW MAINTENANCE COST—Absolute Safety

Center Plate Height 22¾ in. with 26 in. Diam. Wheels

For Modern Low Level Double Truck Cars, the Taylor R. H. Truck, equipped with Taylor S. A. Brake, with large diameter hard steel pins, will provide the best possible service results from every standpoint.

TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.

SPECIFICATIONS ON REQUEST Established 1892 SEND FOR PORTFOLIO

You're having brush trouble

CORRECT IT

Use Le Carbone Carbon Brushes

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W. J. JEANDRON

345 Madison Avenue, New York

Pittsburgh Office: 634 Wabash Bldg.
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

Trade Mark

Wonder what Wheels talk about?

Ajax Check Plates

Ajax Bull Bearing Alloy

Ajax Car Brasses

Their hard luck, probably—just like the most of us human beings. And their hardest luck must be the trips they have to make to the repair shop as the result of inferior bearings. Don't forget, that's your hard luck, too!

In the face of relief possible through the use of extra quality Ajax Bearings and Bearing Metals this isn't so much a matter of luck as it is a matter of judgment—but all the same it's hard luck on the wheels and the passengers who have to listen to their wail.

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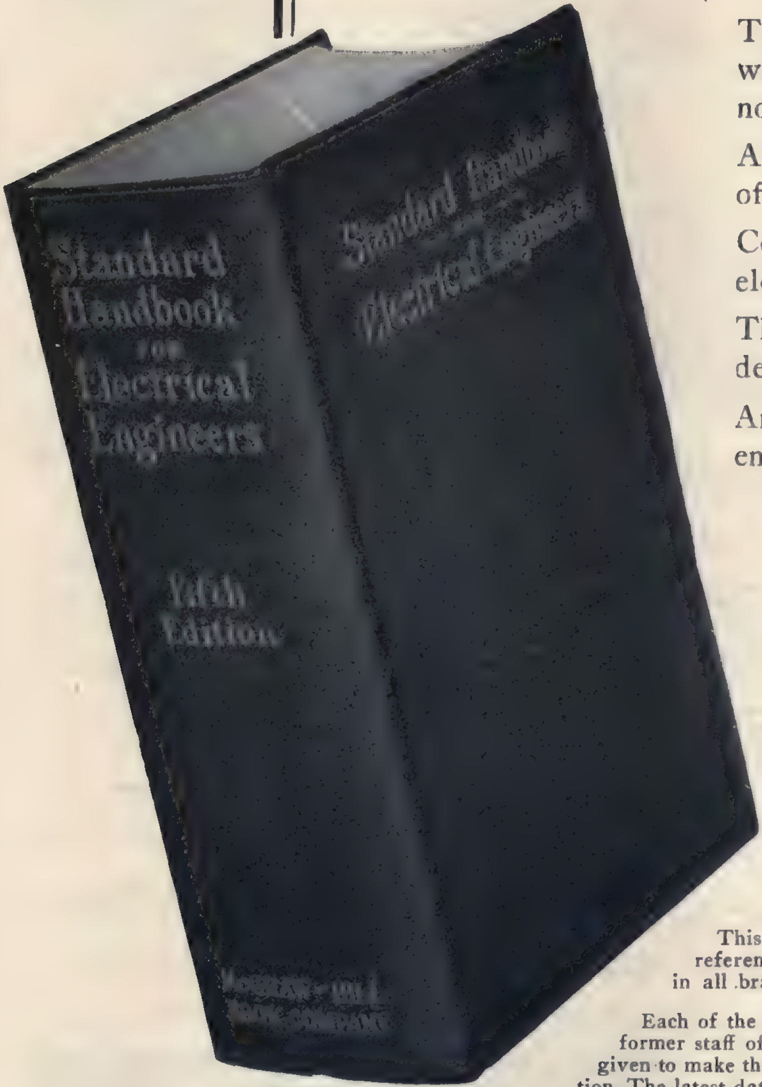
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Electric Equipment Co.
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General Electric Co.

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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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St. Louis Car Co.

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Earll, Chas. I.
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Wood Co., Chas. N.

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Cutter Co.
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.

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Dossert & Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
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General Electric Co.
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Electric Service Sup. Co.
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General Electric Co.

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Ingersol-Rand Co.
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Ingersoll-Rand Co.

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Midvale Steel & Ordnance Co.

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General Electric Co.
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Electric Service Sup. Co.

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Silver Lake Co.

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Electric Service Sup. Co.
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Internationa Steel Tie Co.

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Wharton, Jr., & Co., Wm.

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Massey Concrete Products Corp.

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Edwards Co., Inc., The O. M.
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Morton Mfg. Co.
St. Louis Car Co.

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Electric Equipment Co.

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Eectric Service Sup. Co.

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Wish Service, P. Edward

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Williams & Co., J. H.

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Nat'l Pneumatic Co., Inc.
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Edwards Co., Inc., The O. M.
General Electric Co.
Hale & Kilburn Corp.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.

Draft Rigging (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co
Electric Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Sup. Co.

Electric Grinders
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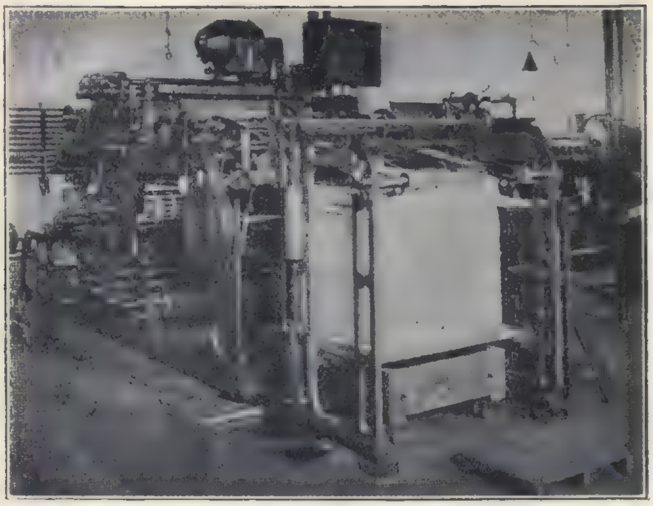

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Interior of the Sorting and Packing Room

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Western Electric Co.

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Indianapolis Switch & Frog Co.

Electrodes, Steel
Indianapolis Switch & Frog Co.

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Archbold-Brady Co.
Arnold Co., The
Beeler, John
Byllesby & Co., H. M.
Day & Zimmermann
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter
Kelly, Cooke & Co.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Inc., Dwight P
Sanderson & Porter
Sangster & Matthews
Smith & Co. C. E.
Stone & Webster
White Engeneering Corp., The J. G.
Witt, Peter

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Ingersoll-Rand Co.
Westinghouse E. & M. Co.

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Edwards Co., Inc., The O. M.

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Economy Electric Devices Co.
Johnson Fare Box Co.
National Ry. Appliance Co.
Ohmer Fare Register Co.

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Cambria Steel Co.
Midvale Steel & Ordnance Co.

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American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
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Carnegie Steel Co.
Midvale Steel & Ordnance Co.
Standard Steel Wks.

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General Electric Co.

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English Electric Co., Ltd.
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Smith Heater Co., Peter

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General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

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Pantasote Co., The

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Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Meater Co. Peter

Heaters, Car, Hot Air and Water
Smith Heater Co. Peter

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Ingersoll-Rand Co.

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Ohio Brass Co.

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Massey Concrete Products Corp.

Hydraulic Machcinery
Allis-Chalmers Mfg. Co.

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Electric Service Sup. Co.
General Electric Co.
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Thompson-Levering Co.
Western Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
Irvingtotn Varnish & Ins. Co.
Mica Insulator Co.
Nat'l Fibre & Insulation Co.
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Westinghouse E. & M. Co.

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Irvington Varnish & Ins. Co.

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Sterling Varnish Co.

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Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.

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Irvington Varnish & Ins. Co.

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Electric Service Sup. Co.
Flood City Mfg. Co.
General Electric Co.
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Hubbard & Co.

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Marsh & McLennan

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Buda Co.
Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Elec. Service Sup. Co.

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(See Rail Joints)

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Brill Co., The J. G.

Junction Boxes
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Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

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General Electric Co.
Westinghouse E. & M. Co.

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Ohio Brass Co.

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Nichols-Lintern Co.

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General Electric Co.
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Columbia M. W. & M. I. Co.
Dossert & Co.
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Electric Ry. Equip. Co.
English Electric Co.
General Electric Co.
Johns-Pratt Co.
More-Jones Br. & Metal Co.
Ohio Brass Co.
Western Electric Co.
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McGuire-Cummings Mfg. Co
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Texas Co., The
Universal Lubricating Co.

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Texas Co., The
Universal Lubricating Co.

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Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
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Wharton, Jr., & Co., Wm.

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Economy Electric Devices Co.

Mica
Mica Insulator Co.

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(See Buses Motor)

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Electric Service Sup. Co.
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Midvale Steel & Ordnance Co.

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Bemis Car Truck Co.
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Packing
Elec. Service Sup. Co.
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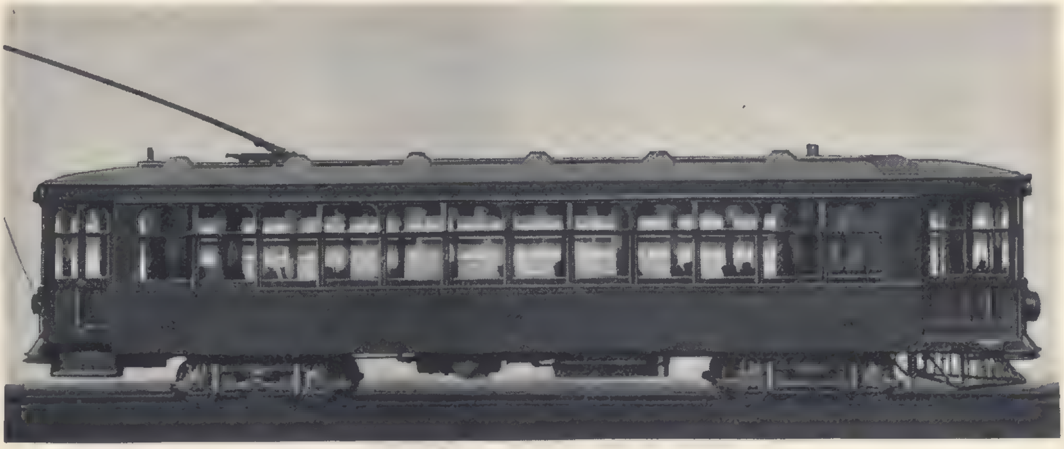
CARS BRILL TRUCKS



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Ten light-weight interurban cars of an especially interesting type, recently developed by the G. C. Kuhlman Car Company, have just been placed in service by the Western Ohio Railway Company, Lima. In determining the character of construction and proportions of this type interurban car every effort was made to obtain the lightest weight without sacrificing durableness of construction or the riding comfort so essential to this class service.

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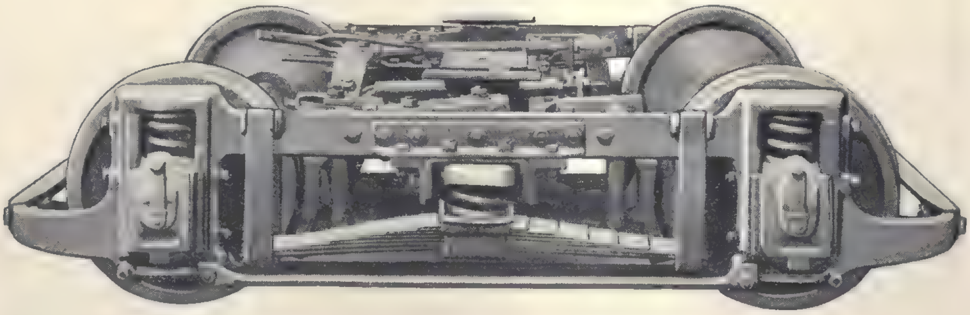

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Eastern Massachusetts Street Railway Light-Weight Car.
Weight complete, 31,850 lb.

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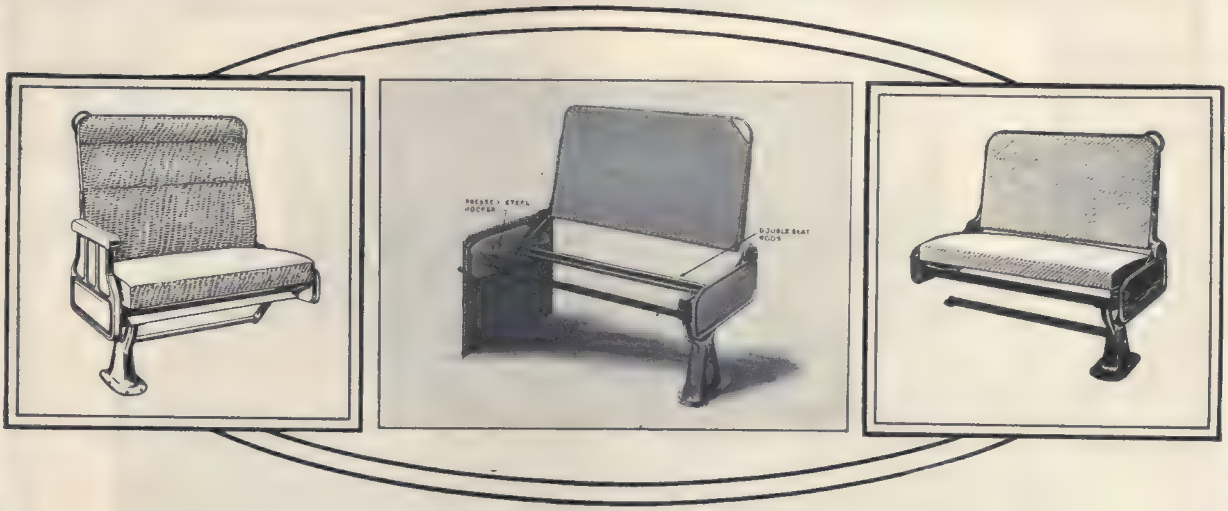
SEATS AND SEATING RATTAN

CAR AND TRUCK SPECIALTIES



Brill "Winner" Seats

For Every Class Service

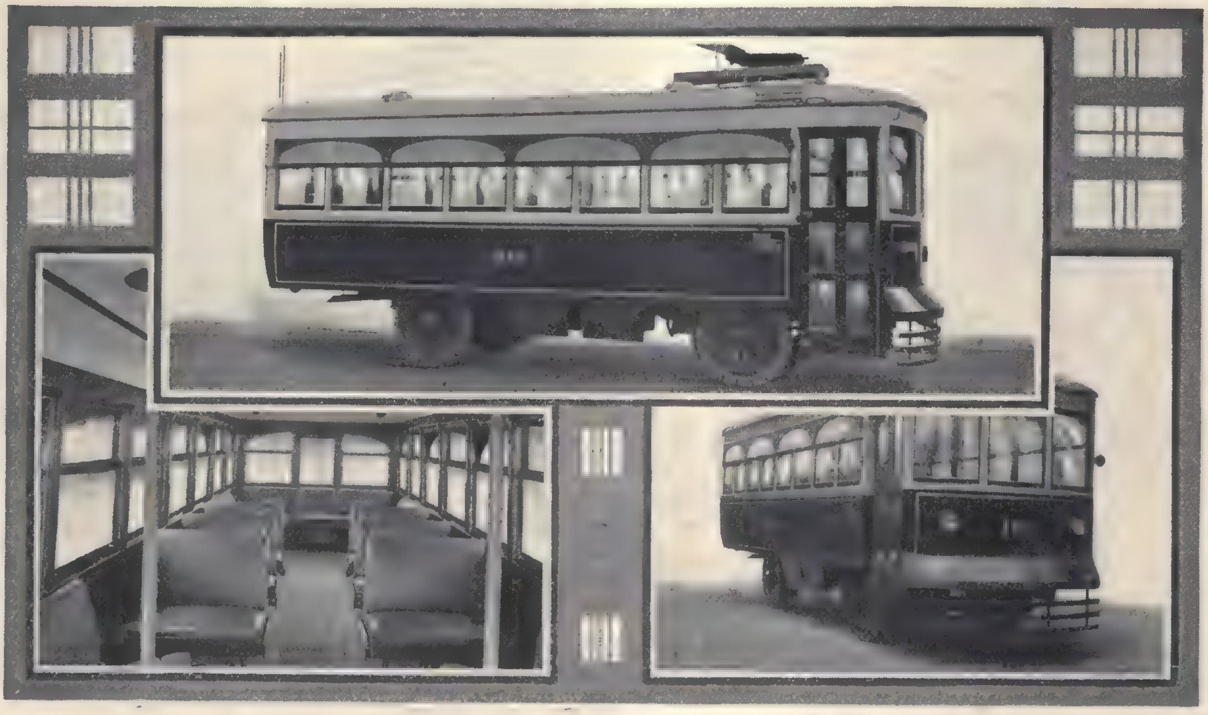
Brill Seats have always been accepted as representing the last word in car seats. Both the "Winner" and "Waylo" types of reversing mechanisms have proved most satisfactory in service and continue to hold first rank in their respective classes.

All reversible and non-reversible seats for passengers, including the rattan upholstery, as well as a variety of types for motormen and conductors, are manufactured complete, ready for installation.

To the use of pressed-steel pedestals and aisle plates, and the minimum number of parts used in their construction, the extreme light-weight characteristic of all Brill seats is attributed.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO. — G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

CARS BRILL TRUCKS



Low Operating Cost Favorable to Brill Rail-less Cars

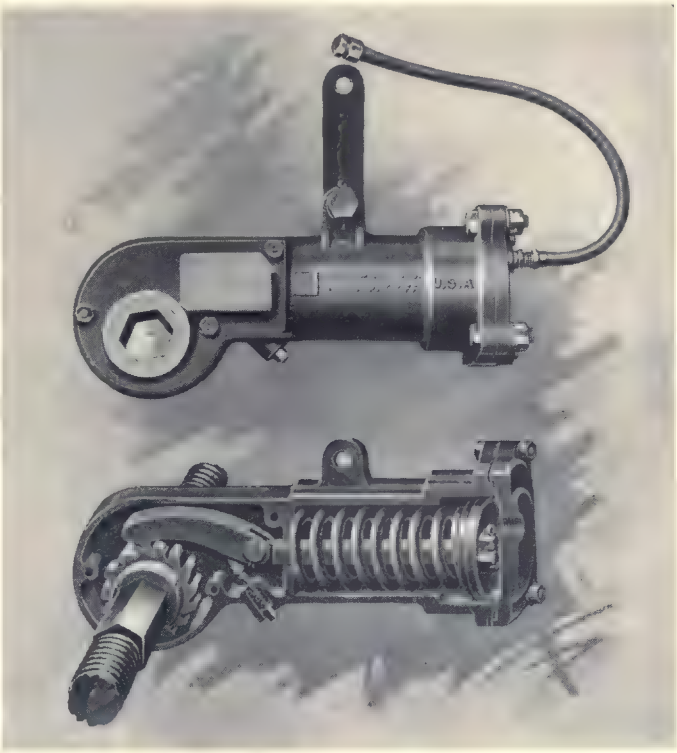
The successfully and economically operated Brill Rail-less Cars enable railways to make service extensions to points where the initial cost of rail service would now be prohibitive. The operating cost of Brill Rail-less Cars is almost equally as low as the modern light-weight cars and, particularly where there is every indication that traffic will ultimately be developed to warrant the laying of rails and operation of Safety Cars, this type vehicle is admirably adapted.

The Brill Rail-less Car is propelled by two (2) 25-hp. motors at 550 volts, mounted in tandem amidship and driving the rear axle through a propeller shaft. Its seating capacity is 30.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — G.C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.

SEATS AND SEATING RATTAN

CAR AND TRUCK SPECIALTIES



Brill Automatic Slack Adjuster

(Patented)

Air Operated

This air operated Slack Adjuster automatically adjusts Safety Car brake rigging when necessary until brake shoes are worn out. It requires no adjustment and its operating parts are protected so that there is no interference from dirt or grit. The Brill Automatic Slack Adjuster will be demonstrated in conjunction with a Brill Standard Safety Car Truck, No. 79-E, at the A. E. R. A. Convention in Chicago.

Brill Spaces 1-4, Section C.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO SPRINGFIELD MASS.

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

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Barron G. Collier
INCORPORATED
Candler Bldg., New York

McGraw-Hill Co., Inc. September 30, 1922 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

Commerce Street Station of the Milwaukee Electric Railway & Light Co., where there are 24 Edge Moor Boilers—total, 16,976 H. P.

HOUSTON PUBLIC LIBRARY
LYCEUM AND CARNEGIE BRANCH
HOUSTON, TEXAS

Lakeside Plant of the Milwaukee Electric Railway & Light Co. Here there are 8 Edge Moor Boilers with a total rating of 10,456 H. P. Note the 5-drum, 4-pass boilers in the center illustration.

Power plant equipment that is selected for electric railway use is bound to be of proven worth, for the electric railways are among the most economical producers of power, as well as the largest. Electric railway operators cannot afford to experiment with untried apparatus, for the very life of their industry depends on economical and efficient power production.

Many of the most successful electric railway companies in the country have chosen Edge Moor Water Tube Boilers as standard equipment. Among this number is the big Milwaukee Electric Railway & Light Company, two of whose plants are here shown. This company ordered its first Edge Moor Boilers—five of 475 H.P. each for the Oneida Street plant—in 1898. This initial order was followed at intervals by twenty-two others, and the company now has 67 Edge Moor Boilers totaling 45,394 H.P. installed in seven different plants.

Significant evidence of the successful performance of Edge Moor equipment under the exacting conditions of electric railway operation!

Similar records from plants in a score of varied industries are included in the new Edge Moor Catalogue, now ready for distribution. Where shall we send your copy?

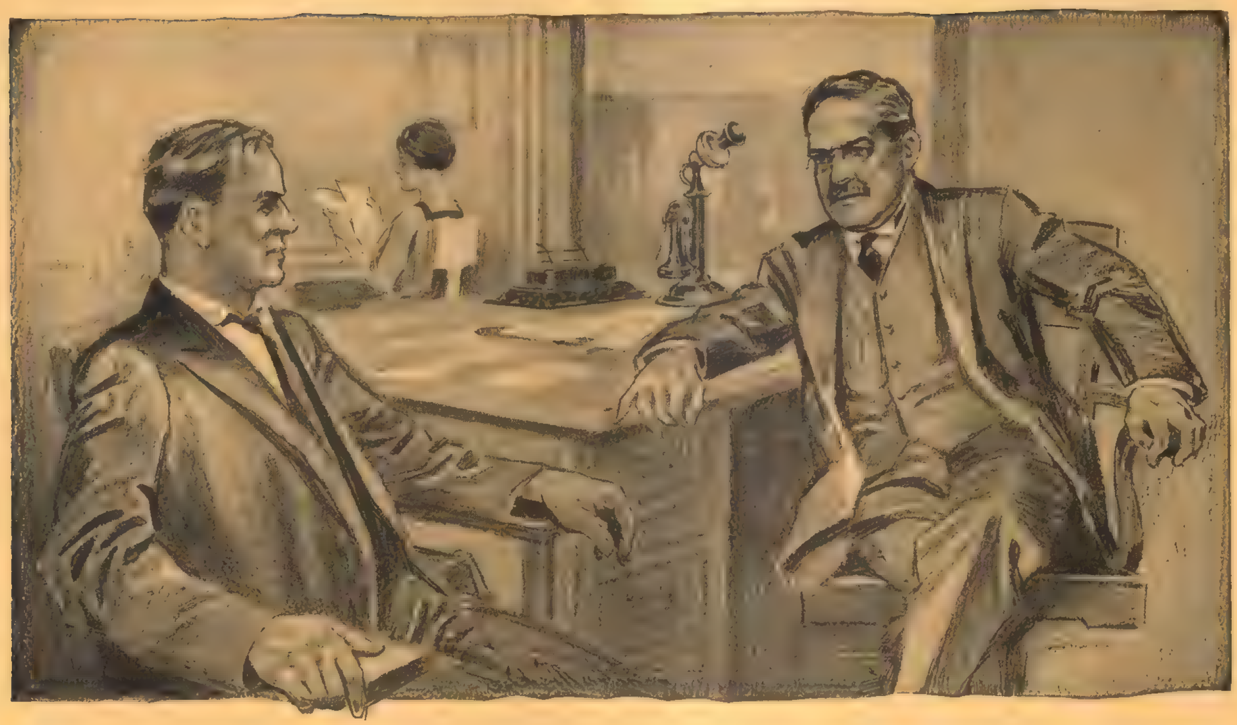
EDGE MOOR BOILERS
EDGE MOOR, DEL. U.S.A.

EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE

EDGE MOOR Water Tube BOILERS

New York
Pittsburgh
Boston
Charlotte
Chicago
St. Paul

FOR INCREASED FUEL ECONOMY



AERA Convention Exhibits

"Joe," said the Vice-President, "I understand the Westinghouse people are going to have a very comprehensive exhibit of their railway motor and HL Control equipments at the AERA Convention. I expect to spend as much time as I can in the Westinghouse Exhibit but will have to depend upon you to make a detailed report of everything you see, giving particular attention to any new developments. Be sure to look over that Westinghouse No. 510 motor I've heard so much about. I think it will be just what we want for the light-weight, double-truck cars we are going to order soon."

"I'll be on the job, Boss," answered Joe. "There'll not be a thing in that exhibit I won't examine, inside and out. From past experience at Westinghouse Exhibits, I'm sure to pick up many valuable points, and I'll give particular attention to that No. 510 motor."

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

W WESTINGHOUSE ELECTRIC

Westinghouse

Vol. 60, *No.* 14 New York, September 30, 1922 *Pages* 497-534

ELECTRIC RAILWAY JOURNAL

Henry W. Blake, Editor

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By Charles Gordon.

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Change of Address—When change of address is ordered the new and the old address must be given, notice to be received at least ten days before the change takes place.
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Keep the Convention Issue

A GREAT many railway companies preserve all issues of *Electric Railway Journal* in bound volumes for reference purposes. But whether or not this practice is followed, all railway men will find it advantageous to keep handy all year the Annual Convention Number published last week.

The Convention Number represents the most painstaking and comprehensive piece of work done by the editors for any one issue of the year. This year it contains a collection of articles which form a very valuable treatise on the experience as to equipment and operation on three of the industry's most important railways—the Chicago Surface Lines, Chicago Elevated Railroads, and Chicago, North Shore & Milwaukee Railroad — street railway, rapid transit and interurban.

Furthermore, it is the most complete buying guide available anywhere of the equipment, supplies and materials produced by the manufacturers serving the electric railway field. From this standpoint alone, it is worth keeping handy until the 1923 convention issue is available to provide a new buyer's guide of corresponding completeness.

Circulation of this Issue, 5,950 Advertising Index—Alphabetical, 44; Classified, 40, 42; Searchlight Section, 39

Service begins in the shop

One way to give satisfactory Street Car Service and obtain the good-will of patrons is to improve the production of car repair shops with dependable Westinghouse Motor Drive.

Such Street Car Companies as the Cleveland Railways and the Pittsburgh Railways use Westinghouse Motor Equipment for their repair shops on all applications.

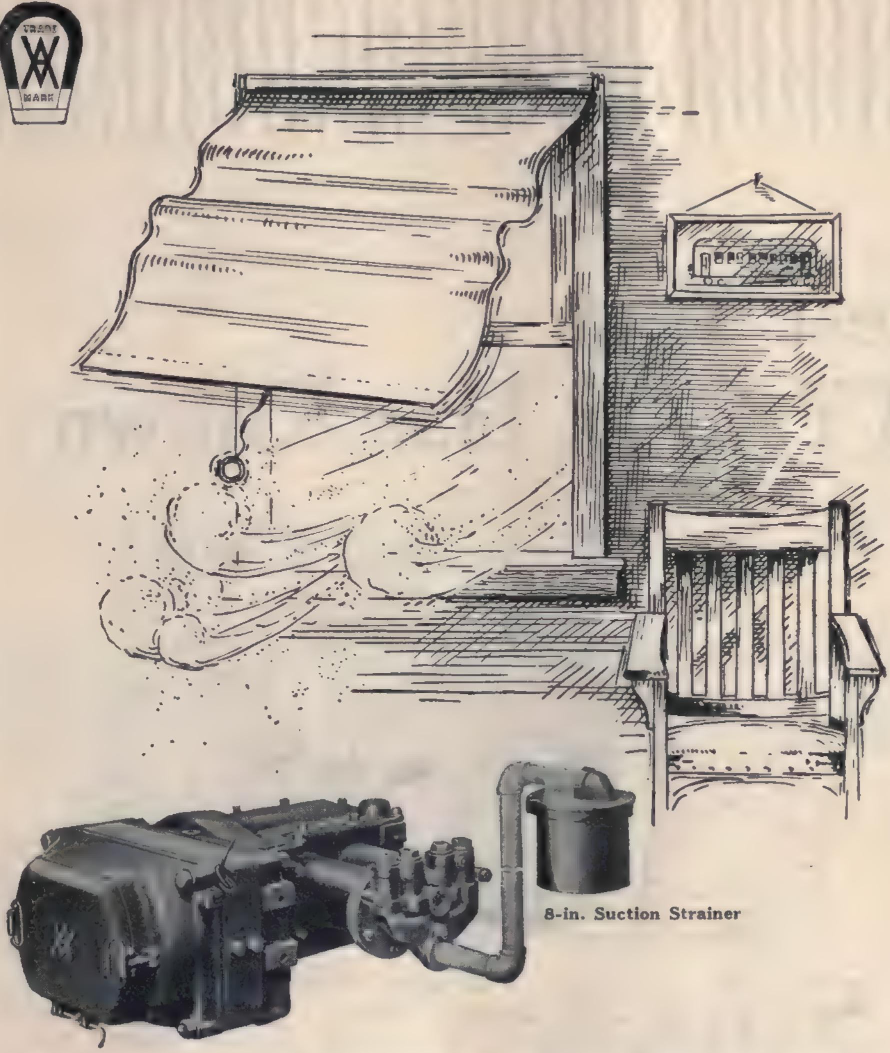
Westinghouse Motors and Control are applicable to every Car Shop Machine no matter what the size or speed.

Westinghouse Engineering Service will help you solve your special Motor and Control Car Shop Problems.

Westinghouse Electric and Manufacturing Co.,
East Pittsburgh, Pa.
Sales Offices in all Principal American Cities

Westinghouse

MOTOR DRIVE FOR RAILWAY SHOPS



8-in. Suction Strainer

You would not intentionally leave your office window open if a dust storm was blowing.

A "dust storm" is always blowing around the Air Compressor on a moving car. In its unfiltered state, the air which must be depended upon for prompt, efficient operation of the brake system is filled with minute particles of hard, gritty dust and dirt.

Unless the Compressor is adequately protected against the inflow of this foreign substance with the suction air, the lubricating oil, instead of performing its intended function, becomes an abrasive mixture which cuts away the working surfaces.

The installation of a Westinghouse 8-inch Suction Strainer, with its thick protective screen of pulled curled hair, bars out the dust and dirt, keeps the Compressor in clean, smooth working condition and results in more economical service by minimizing maintenance expense.

Write for Descriptive Leaflet 2422.

Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

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Washington
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San Francisco

WESTINGHOUSE TRACTION BRAKES

1922

The Greatest Year the SAFETY CAR Has Known

One of the many Safety Cars which are helping to solve the traffic problem in Brooklyn.

The Brooklyn Rapid Transit Company recently ordered 174 new sets of Safety Car Control Equipment.

SINCE 1916 the Safety Car has been an outstanding factor in the successful effort of the traction industry to weather a period of abnormal economic adjustment.

By resorting to a more economical form of service, as typified by the Safety Car, and without any sacrifice of passenger comfort or convenience, many companies found impending losses turned into substantial earnings.

Passing years and better times have not changed matters; the Safety Car today is enjoying a popularity that surpasses all records of the past.

1920 was regarded as the peak year in Safety Car expansion, but the first eight months of 1922 reveal a monthly average increase of 25 per cent over 1920 in orders for Air Brake and Safety Car Control Equipment, which is convincing proof that the Safety Car meets existing general conditions in the street railway field better than any other class of service yet developed.

We supply the Air Brake and Safety Car Control Equipment which is the fundamental characteristic of the Safety Car.

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

Use O-B AW-7 and AW-8 Rail Bonds To get good bonding and keep it

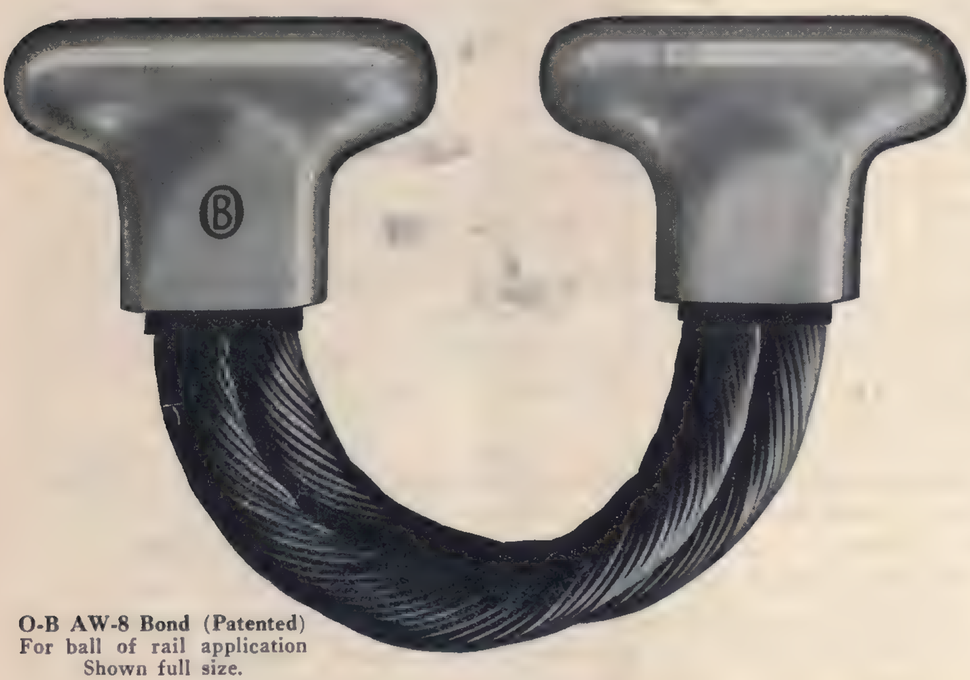
Good bonding is a first essential of economical operation. And O-B AW-7 and AW-8 are the economical ways to get good bonding that stays good.

Every design detail of O-B AW-7 and AW-8 Bonds contributes to good work or to long life or both. For instance:

Copper strands are thoroughly welded, at the factory, into a heavy steel terminal which protects the copper during welding, which adds strength to the weld and which provides "steel to steel with steel" welding on the job.

O-B AW-7 and AW-8 Bonds have a wide angle welding scarf which makes good welding possible and which gives room for an adequate volume of metal.

A copper sleeve, around the strand where it joins the terminal, absorbs and damps vibration.



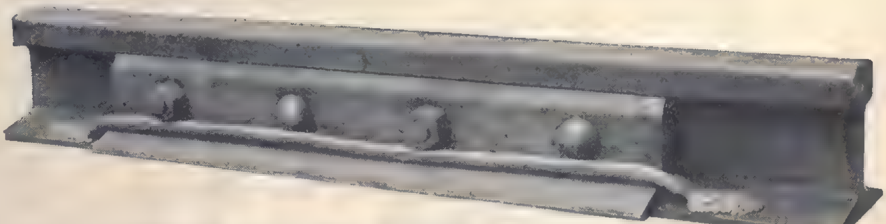
O-B AW-8 Bond (Patented)
For ball of rail application
Shown full size.

O-B AW-7 and AW-8 Bonds improve the return circuit enough to pay for themselves and then stay on the rails to earn a clear profit.

Better order now while you can get shipments from stock.

Arc Welding Machines

Wilson Plastic Arc Rail Bond Welder embodies the latest and best principles of arc welding in a form suited for track work. It is a dynamotor. O-B Grid Type Resistance Welder includes some unique control features which bring speed and safety to the work.



O-B Type AW-7 Bond (Patented) **Installed**
It is easy to weld on all sides of the rounded terminal.

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LONDON

September 18, 1922.

IN REPLYING PLEASE
REFER TO H.W.C.

Gentlemen:-

RE: INSURANCE

Through the work of the N. E. L. A. Insurance Committee, the Fire Insurance Companies have formulated a new schedule of rates that effects every power house and substation in the United States, and the tendency of same is a reduction in your insurance cost.

A very large amount of fire insurance on public utilities is cared for by our office, and we have analyzed, through our Engineering Department, the application of the new rates to all our properties and, therefore, are thoroughly conversant with the details of the new schedule.

It is our thought that representatives of your Company will be present at the annual meeting of the A. E. R. A. in Chicago, October 2nd to 6th inclusive. We are members of this organization, and have taken space on the Municipal Pier, known as Booth #47, Section "B", to which we cordially invite you to bring to our attention any questions pertaining to insurance, and we believe our experience would enable us to help you in the readjusting of your rates under the new schedule or any other matters pertaining to the insurance business.

If you are not to be represented at the Convention, we invite your submitting your problems to us by mail or in person.

Minimum rates can be obtained provided you can conform to certain schedule requirements that measure the fire hazard of your property.

Yours very truly,

MARSH & McLENNAN

BY H.W. Carlile

HWC:MC

ADDRESS ALL COMMUNICATIONS TO THE FIRM

A Big Year in Track Construction

is a big year for

STEEL TWIN TIES

MORE paved track is being laid this year than for the past five and, naturally, 1922 is a big year for STEEL TWIN TIES.

From San Diego, California, to Boston, Massachusetts, the initial economy and proven dependable performance of Steel and Concrete for track foundations have decided more and more companies for Steel Twin Tie Track.

Lower material and labor costs say "Rebuild paved track *now!*" But select the type of paved construction with the lowest cost per foot, per year.

For comparative records in your consideration of this question write today for our complete data folder. It presents details of the twelve-year record of Steel Twin Tie Track and includes an estimate of the cost of Steel Tie construction on your lines.

When checking over your convention program add this note—see the Steel Tie exhibit, booths 113 and 114, Sec. D, Municipal Pier.

The International
Steel Tie Company
Cleveland, O.

Steel Twin Tie Track

Carry an Ajax Portable Electric Arc Welder

SPECIFICATIONS

Weight—only 155 lbs.

Dimensions—18 in. x 28 in. x 36 in.

Capacity—333 amps. at 600 volts.
—200 amps. at 300 volts.

Control—Switchboard attached.

Equipment—Electrode Holders.
—Trolley Pole.
—Cables.
—Face Shield.
—Canvas Cover.

Write for circular and prices

It will pay you well to carry one or more of these sturdy little machines in your track department equipment. Light, rugged, easy to operate, inexpensive to maintain, the Ajax Electric Arc Welder is the most practical instrument ever devised for the maintenance of electric railway track. Its extremely high capacity at all operating voltages makes it especially valuable for accomplishing strong, deeply-penetrating welds under all conditions.

Strengthen Your Track Department

with

Universal Rotary Track Grinders
Atlas Rail Grinders
Reciprocating Track Grinders

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

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Boston

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Pittsburgh

Atlas Railway Supply Co.
Chicago

P. N. Wood
New Orleans

DOWN IN CHATTANOOGA

The Chattanooga Railway & Light Co. use

Golden Glow Headlights

to safely light the way for their trolley cars. This company and the other progressive traction corporations that are using Golden Glows find them practical and efficient headlights that are not offensive to opposing traffic.

These same operators are making it easy for their patrons to indentify the destination points of their cars, day and night, by using

Keystone-Hunter Destination Signs

Remember!—there is a Golden Glow Headlight and Keystone-Hunter Sign for every type of car and every character of service.

Send for data sheets

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

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50 Church St.

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Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Montreal, Toronto, Winnipeg.

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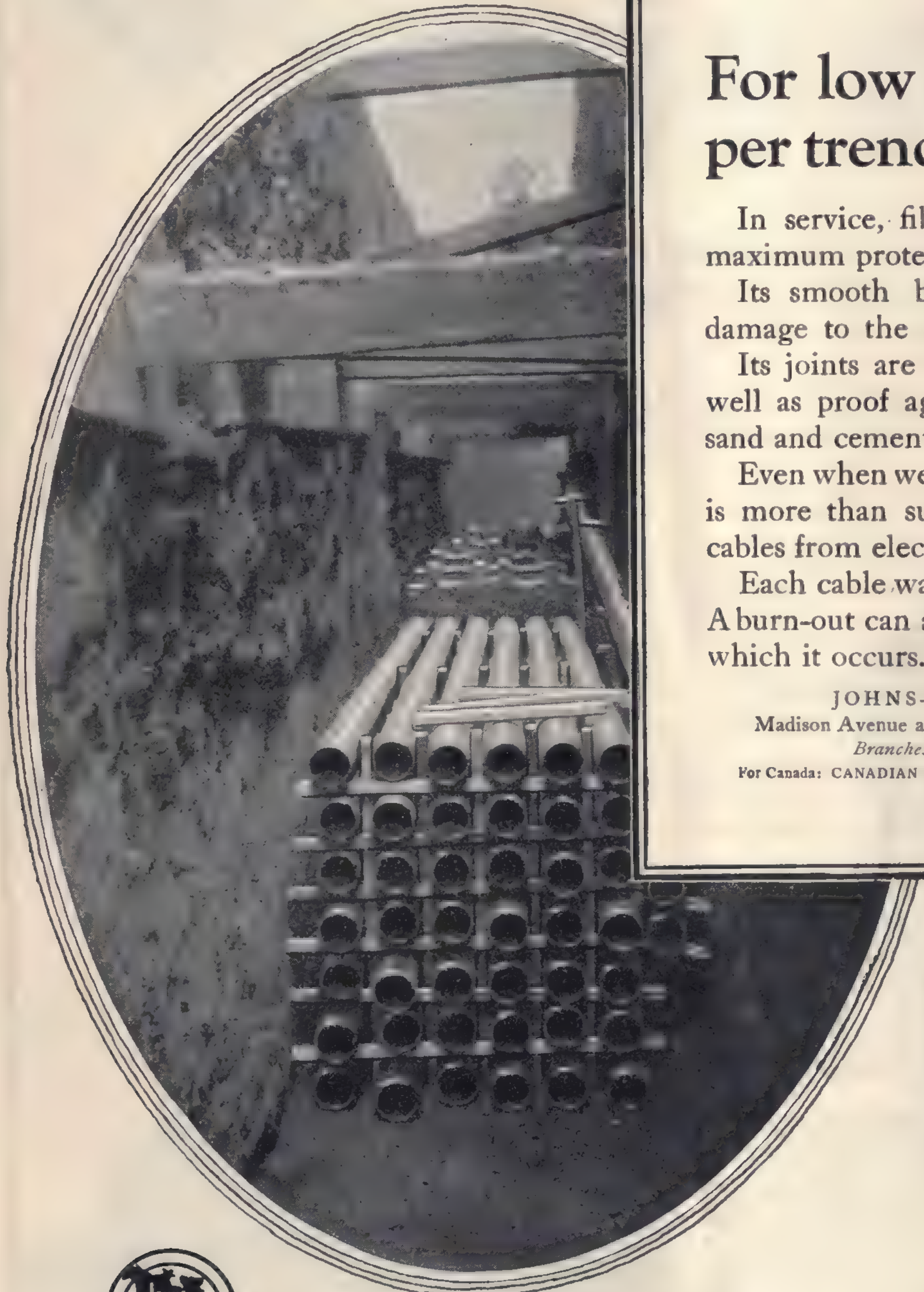
FIBRE CONDUIT



For low cost per trench-mile-year

In service, fibre conduit gives the maximum protection to its cables.

Its smooth bore does away with damage to the cable in drawing.

Its joints are water and gas tight as well as proof against the intrusion of sand and cement.

Even when wet, its dielectric strength is more than sufficient to protect the cables from electrolysis.

Each cable way is an individual unit. A burn-out can affect only the cable on which it occurs.

JOHNS-MANVILLE Inc.
Madison Avenue at 41st Street, New York City
Branches in 56 Large Cities
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THE FIBRE CONDUIT CO.
REG. U.S. PAT. OFF.
ORANGEBURG
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JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT
Through—
Electrical Materials
FOR
Utilities
Jobber
Contractor
AND
Dealer

JOHNS-MANVILLE
Sole Selling Agents

Modernize! *Pneumatize!*

If Crowds Would Stand in Line—

If passengers would take their time, *if* people would be cautious and deliberate and reasonable, *if*—

But—we all know that they won't do any such thing! Give them the slightest opening and they will leap on and off moving cars, hang on steps and running boards, and do almost everything else they shouldn't do.

So—to save them from themselves, it is necessary to make cars proof against the recklessness of the American public. Many roads have already accomplished this by equipping cars, both old and new, with—

The Complete
National Pneumatic "Rushour" Line

Door and Step Operating Mechanisms
Door and Step Control
Safety Interlocking Door Control
Motorman's Signal Lights
Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

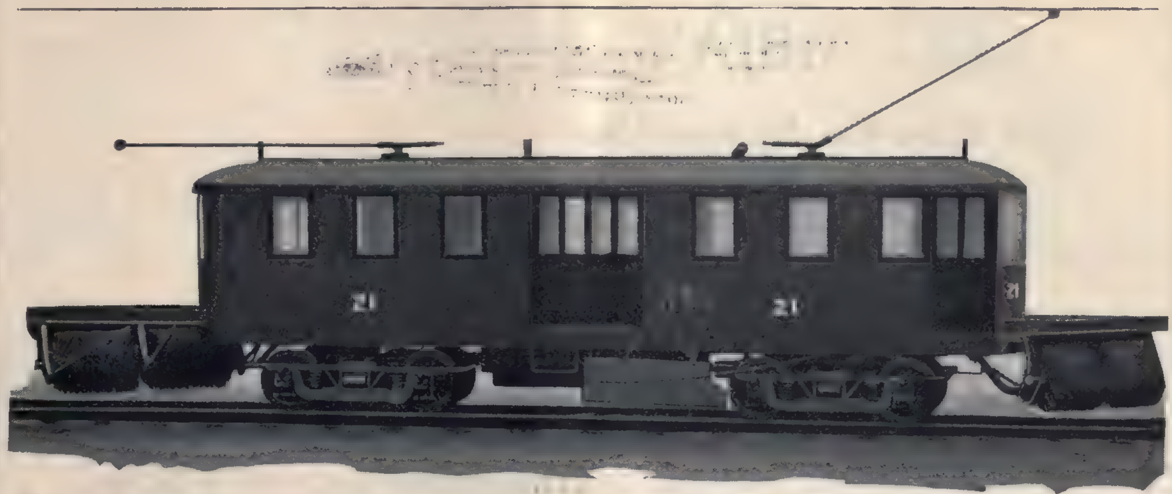
National Pneumatic Company, Inc.
50 Church St., New York
McCormick Bldg., Chicago
Works, Rahway, N. J.

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier
INCORPORATED
CANDLER BLDG NEW YORK

Snow Fighting Equipment



Double Truck, Steel Underframe Sweeper

THE utility and economy of this Combination Snow Sweeper and Baggage, Express and Work Car are obvious. It is adaptable for service in all seasons of the year. Extreme length is 49 ft. 1 in. over the brooms. Exterior width over all is 8 ft. 6 in. when used as Snow Sweeper.

The car body over the buffers, with the brooms removed, when used as a work car is 35 ft. 0 in. in length.

The underframing of the car is entirely of structural steel, sills being 8 in. "I" beams; buffers 7 in. by 3– in. angles. The frame is is braced diagonally, making the same very rigid and strong. The super-structure of the car is of wood, of standard baggage car construction. Car is sheathed both inside and out. Roof is of the "turtle deck" type, covered with No. 8 cotton duck.

Brooms and broom-driving mechanism, also the side plows can be readily removed in order that car can be used as express baggage, or work car during summer months.

Blueprints and specifications will be submitted on request.

Selected Snow Sweeper Rattan on Hand, ready for Immediate Shipment.

McGUIRE-CUMMINGS MANUFACTURING CO.

GENERAL OFFICES
111 WEST MONROE STREET
CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars, Snow Sweepers, Electric Locomotives.

COLUMBIA 1892 MACHINE WORKS

COLUMBIA'S
Best Known Specialties

BEARINGS
GEAR CASES
MOTOR COILS
TROLLEY WHEELS
TROLLEY EARS

A Service Station for Electric Railways

Specialists for many years in the manufacture of electric railway materials, practically our entire output is now consigned to your industry.

Although the items enumerated above are most widely used, we are making almost every kind of metal part and device used in car maintenance. Truck parts, motor parts and body fittings, standard or special, are all in our line. And we can make them at lower cost than your own shop.

Large stocks of standard parts always on hand enable us to supply your wants promptly and satisfactorily. Use Columbia as your *service station.*

The Columbia Machine Works
and Malleable Iron Company
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

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Weighed in the Scales of Service

Lubricating oils are not a bit different from other supplies or equipment used by the street railway—they are worth what they return in service. The gallon of oil that gives one hundred units of service is worth two of the gallons that delivers but fifty, without counting the loss of time necessary for the extra application.

Service—and not bulk—must be the standard by which real value is weighed. When the "low service per gallon" that always results with the "low price per gallon" oils now marketed for railway lubrication are considered, the first cost feature is not so attractive.

Galena oils are sold on a closer margin of profit than any article of equipment that enters into street railway operation. They are the highest quality lubricants that can be manufactured. While their first cost to the railway is slightly higher than that of ordinary oils, their ultimate cost is far less when service is considered.

This economic feature of Galena oils has been demonstrated on hundreds of electric roads and the practical evidence of their matchless lubricating efficiency may be seen on any railway under Galena lubrication.

"It is not the gallon of oil,
but the service the gallon contains,
that counts!"

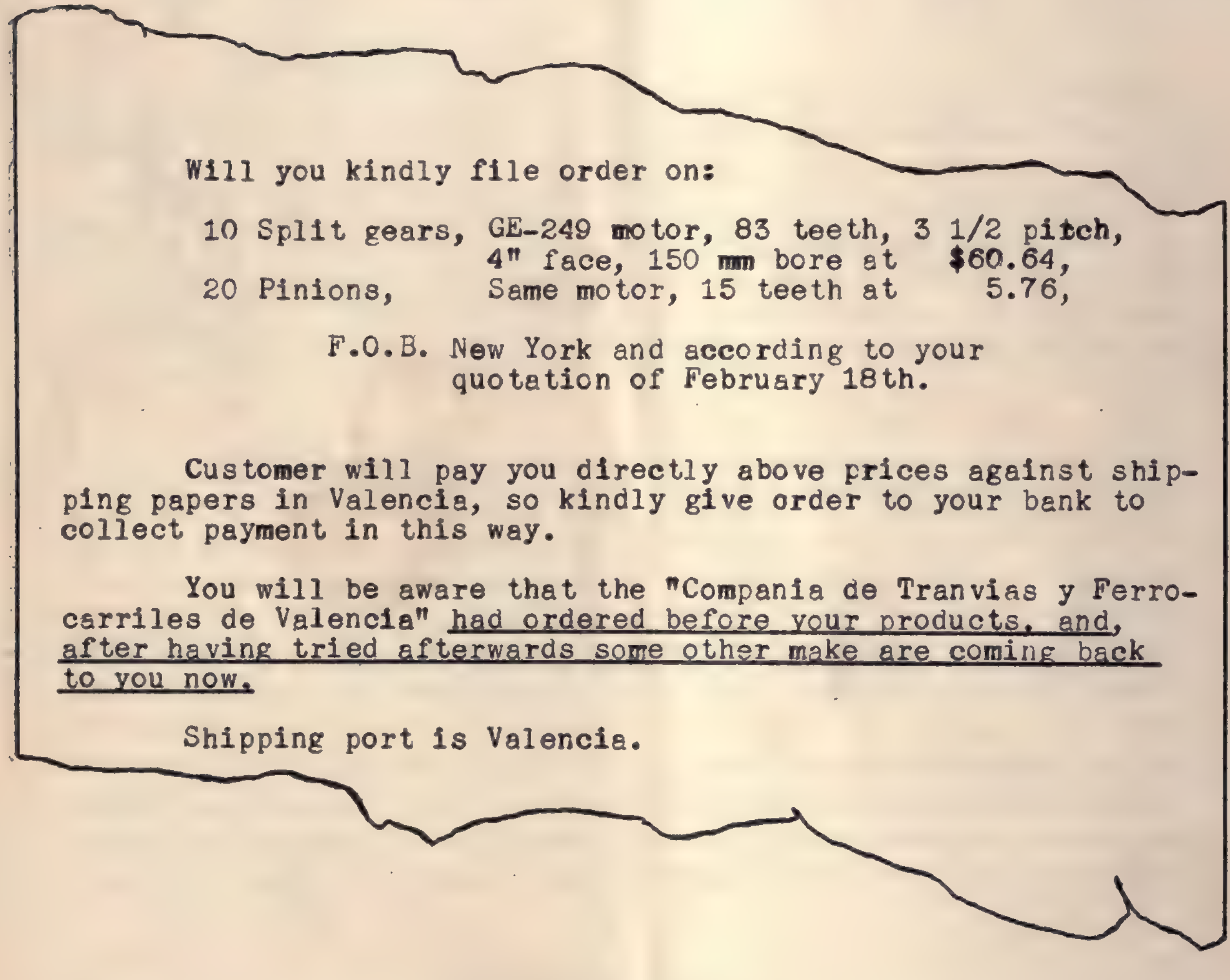
QUALITY - SERVICE - ECONOMY - GALENA OILS
GSC

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities

QUALITY - SERVICE - ECONOMY - GALENA OILS
GSC

SPAIN *Says:*

T. S. Q. means this



Will you kindly file order on:

10 Split gears, GE-249 motor, 83 teeth, 3 1/2 pitch,
4" face, 150 mm bore at $60.64,
20 Pinions, Same motor, 15 teeth at 5.76,

F.O.B. New York and according to your
quotation of February 18th.

Customer will pay you directly above prices against shipping papers in Valencia, so kindly give order to your bank to collect payment in this way.

You will be aware that the "Compania de Tranvias y Ferrocarriles de Valencia" had ordered before your products, and, after having tried afterwards some other make are coming back to you now.

Shipping port is Valencia.

We lose a customer now and then to that "just as good" competition, but they come back to

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality

Tool Steel Gear and Pinion Co.
Cincinnati, Ohio

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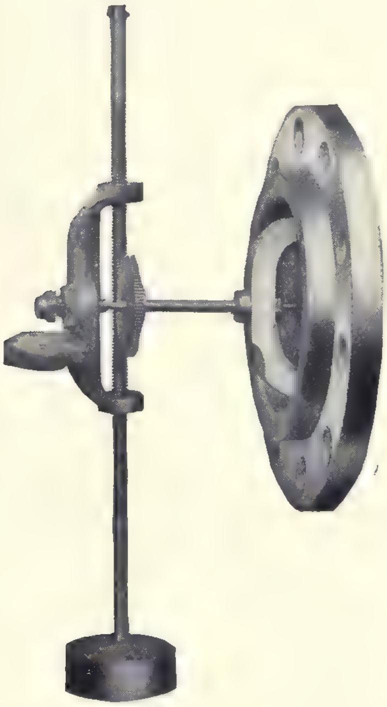

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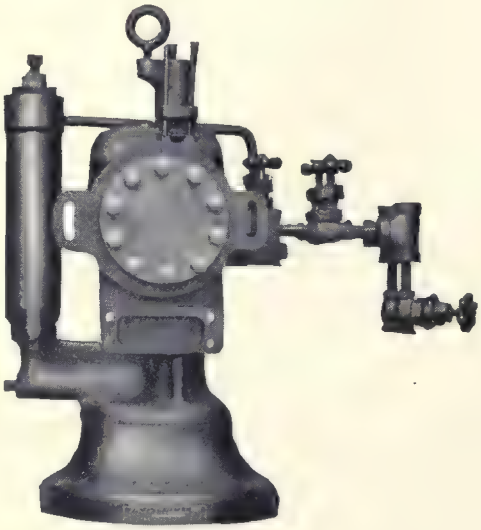

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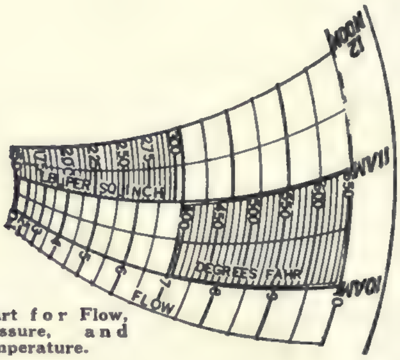


Chart for Flow, Pressure, and Temperature.

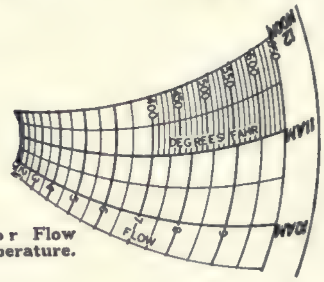
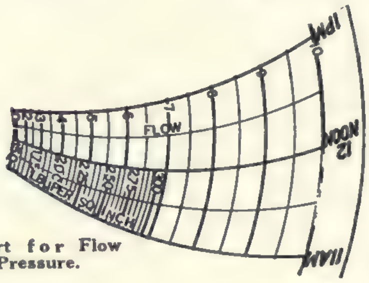


Chart for Flow and Temperature.



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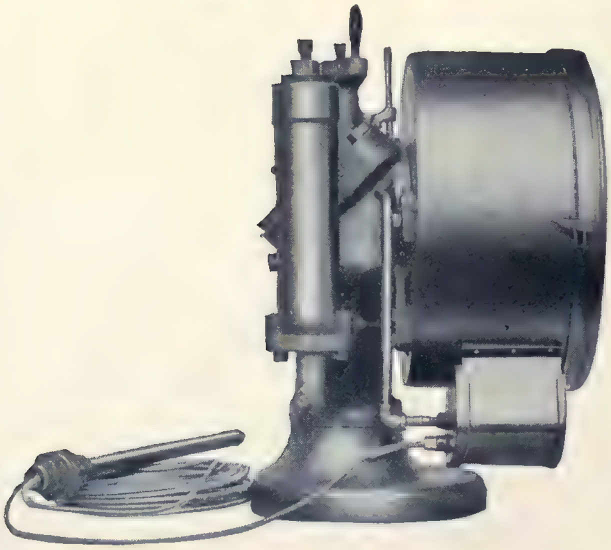

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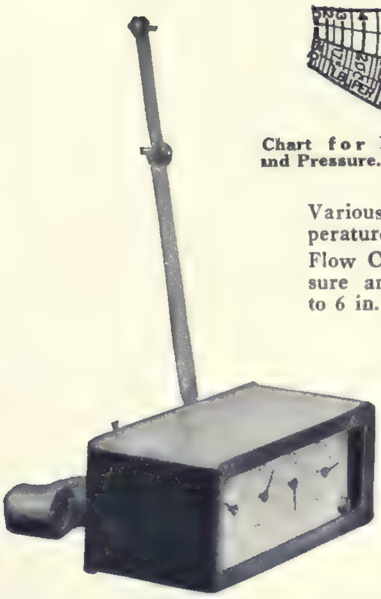

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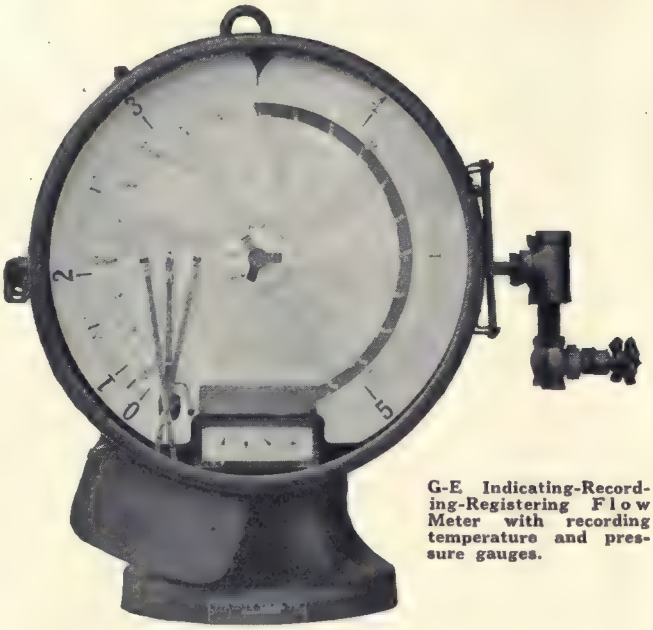

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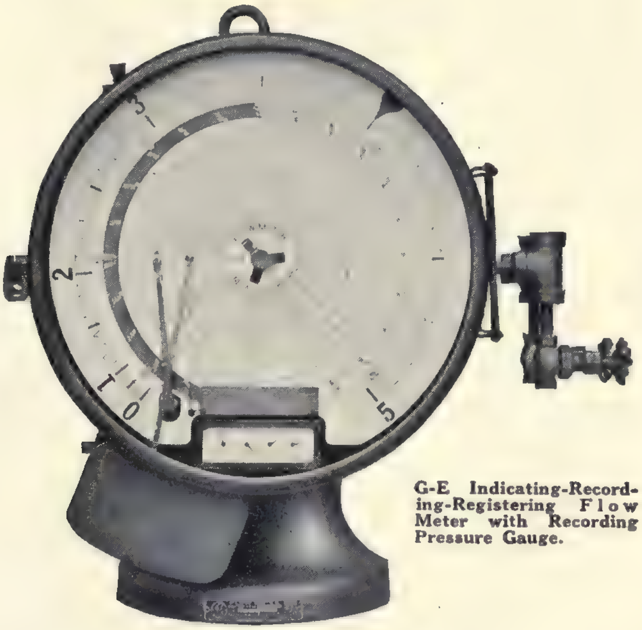
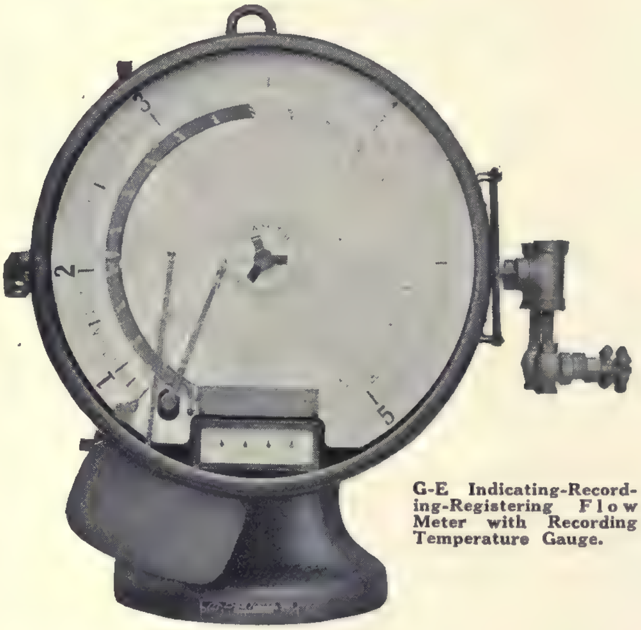
G-E Indicating-Registering Flow Meter without graphic chart.



G-E Indicating-Recording-Registering Flow Meter with Recording Pressure Gauge.



G-E Indicating-Recording-Registering Flow Meter with Recording Temperature Gauge.

These newly designed G-E Flow Meters can be furnished for four different combinations of reading:

—flow;
—flow and temperature;
—flow and pressure;
—flow, temperature and pressure.

They can also be supplied without the graphic chart, for indicating the rate of flow and registering the total flow.

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Prompt Report of the Convention Assured

ALTHOUGH the convention this year will be held one thousand miles from New York and the sessions of the affiliated associations will not be finished until late Thursday afternoon, the *Electric Railway Journal* expects to publish its first report number on Saturday, Oct. 7. This number will contain a report of all the meetings of the American, Transportation & Traffic and Engineering associations, including in the report of the Engineering Association the joint meeting of the Engineering and Accountants' associations. The report of the Accountants' meetings, it is expected, will be published in the issue of Oct. 14 and that of the Claims Association in the issue of Oct. 21. This division is to be adopted because of the large amount of material which has to be published.

As in former years, a verbatim report of the meetings or the publication of the reports and addresses will not be attempted. Those who need the full report of these meetings will be able to find it in the proceedings of the various associations when published. The reports in this paper should, however, give to the reader a clear idea of the important matters taken up at the Chicago convention, both in the formal addresses and reports and in the discussion which takes place on the floor.

This paper acknowledges the assistance which it has received from many sources in preparing for its report issue. A large number of those who expect to present reports or addresses at Chicago have furnished advance material. The assistance of the executive secretary of the association and his staff is also acknowledged.

Advance Distribution of Convention Reports Can Be Overdone

HERETOFORE the American Association has been lavish in the distribution of advance copies of papers and committee reports. This was done in the hope (a partly vain one) that the pamphlets would be carefully read in advance. The practice was, theoretically, commendable, but practically its efficiency was low. With all the coaxing that could be done it was difficult to get "copy" for these advance publications until perilously near convention time; thus the packages arrived at the offices of busy executives just when they were trying to clear their desks for a few days absence. With two or three reports in which they were individually interested came many for which they did not care a rap.

This year every one who wanted advance copies got them by the simple expedient of asking for them. The engineers received all of their technical committee reports, anyway, because these consisted largely of specifications and other details which positively cannot be taken up in detail at the meeting. Votes, to be intelligent, must be based on information, hence the wisdom of this particular distribution. Of course, all persons invited in advance to take part in discussion also received advance copies. It would appear, then, that the attendants at the convention will be as well prepared as ever to discuss topics on the program and, judging by the splendid work done by the committees, the discussion ought to be a huge success. A lively discussion not only "heartens" a committee, but brings out practical information in support or rebuttal.

Detroit Municipal Discovers Way of Reducing Operating Expenses

ONE of the advantages claimed for municipal ownership and operation of street railways is that funds for their capital account can be borrowed at lower rates than if the enterprise were owned by individuals. Thereby, the advocates of municipal ownership point out, an immediate saving is secured in the overhead charges. Of course, broadly speaking there is no saving in this ability to use public credit to conduct a business enterprise. Municipal bonds sell at a lower interest rate than bonds of private corporations for two reasons only. One is that their principal and interest are exempt from taxation. The other is that taxation can be depended on to make up a deficiency in earnings if any should exist. Neither of these has any real economic merit because the burden is shifted, not removed. Freedom from taxation simply means that taxes have been taken from one enterprise to be laid on another, while the presence of public credit in a municipal project is an added burden to the citizens and may often be quite costly to those who pay taxes.

Reports from Detroit this week indicate that still another short road to a favorable income account for the municipal railway there has been discovered. This is to transfer to the city the cost of constructing and maintaining pavement between the car tracks that was formerly paid by the railway company. Mayor Couzens has recommended this to the Council, which has approved it, and it will now be placed before the voters as a charter amendment at the November election. The statement is made in Detroit that this will save the municipal street railway system several millions annually. It is rather amusing to note that in advocating this plan in his message to the Council, the Mayor points out that the former method was an inheritance from the horse car days, when the horses wore out the pavement, but at present it makes no difference to the car rider whether there is any pavement between the tracks or not.

Now this may be a very good reason why the city should relieve the railway system of the paving burden, and there may be other reasons, but would this amendment have been indorsed by the Mayor and Council and submitted to the voters if the Detroit United Railway was still operating the line and put forward these same arguments?

More Speed—More Economy—More Revenue

IN MANY of the smaller cities it is our observation that the street railways are suffering from needlessly slow schedules. There is about the entire operation an attitude of leisureliness that in the aggregate makes a very expensive operation and one that not only does not attract patronage but actually inspires disgust with the service. It is obviously such a wasteful practice that it is hard to understand how any management could permit the condition to exist. Yet it is not uncommon. More speed—more snap generally to the service—would mean more car-miles per car-hour. This could be translated into fewer platform-hours to pay for, or, better, more service with no increase in platform time. On either basis, that is, more rapid service with no change in headway, or more rapid and more frequent service, the number of riders carried would be practically certain to increase. For in the smaller cities so many of the movements of the people are within easy walking distance that either infrequent or slow service tends to lose many fares that frequent and rapid service would secure. It is difficult to find any satisfactory explanation why the average miles per hour schedule speed should not be as great in the small cities as it is in the larger ones, yet the speed in the latter is almost invariably higher. The traffic congestion the smaller company must contend with is less, the loading lighter and the number of stops per mile fewer. The reason seems to lie in the attitude of mind of the management and men—a thing readily improved if attention is turned to it.

Interest in Pulverized Fuel Is on the Increase

A SIGNIFICANT development in the power field in recent months has been the renewed interest in the burning of coal in pulverized form under power plant boilers. There are now several systems available for this purpose and much credit for their persistence in overcoming great obstacles is due the engineers who have seen the possibilities of this kind of firing. The high prices of coal have forced attention to boiler room economies, and, naturally, the first possibility to suggest itself is that of increasing furnace efficiency. Adaptation of stoker and furnace construction to the kind of fuel available is the problem before the combustion engineer. This is the foundation of combustion engineering.

One unsettling feature in this whole situation has been the variation in the quality of the coal available for a given plant. And at the same time electric railway managers have been looking around to see if cheaper grades of coal than their present ones cannot be had. These facts, especially the latter, have had the result of making easier the securing of orders for pulverized fuel equipment. The orders indicate that the hesitancy in taking so radical a step as that involved in changing to pulverized fuel is passing. This hesitancy has been due to the comparative newness of the development, but as the working exhibits increase in number engineers have an opportunity to do as is their wont, namely, visit the plants now operating and study their operation in person. The result is one convert after another.

The present interest in the burning of pulverized fuel is due to its novelty. In due course it will find its own sphere and will take its place as a possibility whenever the layout of a boiler furnace plant is considered.

Committees Deserve More Thanks than They Usually Get

THOSE railway men who have seen the mass of reports issued from the American Association office in connection with this year's convention have some concept of the volume of work done by the committees during the past year. These committees do an educational and professional service for the industry which is only dimly visualized by many. They prepare for their fellow workers helpful material which would cost large sums to get in any other way, and they supplement the activities of the technical press in the electric railway field. These journals necessarily cover a wide range of topics and can give only limited space to details such as specifications. There is no limit to the reasonable size of the reports and a few always run to considerable size. The committeemen form a consulting staff five hundred strong. Those who remain at home as well as those who attend the convention profit by their labors.

Plain Span Overhead in High-Speed Service

ONE of the interesting things about the physical plant of the Chicago, North Shore & Milwaukee Railroad in relation to the remarkable development of the business of the company is that the plain span type overhead designed for a comparatively slow-speed service is still being used with good success in what has come to be very high-speed service. Part of the ability to get along under these circumstances is no doubt attributable to the development of the sliding shoe trolley, which is undoubtedly far superior to the wheel for fast train operation from the standpoints of quietness within the car, freedom from dewirement and consequent delay, and wear on the trolley wire and ears. But the main lesson to be derived from the experience of the North Shore Line is not that direct suspension construction has been proved satisfactory, but rather that a company can give reliable, popular, high-speed service in spite of this handicap. It has been accomplished at the price of persistent and painstaking maintenance and inspection. The plain span must be kept in a high state of repair. Even so it is not ideal. This accounts for the fact that a catenary system will probably some day be strung on this line.

The Toonerville Trolley—It Meets All Trains

FONTAINE FOX, with his inimitable humor, has made a national character of the skipper and his Toonerville trolley. Railway men have not always relished the puns upon their kind of service but they have had to laugh at the predicaments of the skipper and the picturesque postures of the very little car. Too, they have sometimes feelingly sympathized with the skipper in his adversity. But underneath all the humor, is there not a characteristic of the Toonerville service in which railway men can take pride and use in countering the friend who compares the trolley in real life with that in the cartoons? The "Toonerville Trolley" is a joke, but don't forget that "it meets all trains," for that bespeaks the great dependability of the service. Whatever other attributes a trolley line may have, lack of reliability would be the final censure. But as long as the service is ever available and dependable, as that pictured, oblivion is not in the offing for the trolley.

Conclusion of the discussion begun in last week's issue on the performance experience with successive car designs in Chicago—The section this week treats of the cars purchased since the three-year rehabilitation period ending with 1909, including the near-side cars, trailers and one-man cars

Developing Chicago's Street Cars

By WRAY T. THORN
Assistant Engineer Cars and Equipment
Board of Supervising Engineers, Chicago Traction

THE cars added to the rolling stock equipment of the Chicago Surface Lines since the end of the three-year, or rehabilitation period, have been varied in design and equipment. They will be treated in the general order in which they were acquired as indicated in the table published last week with the first half of this article.

The group of 215 double-truck arch-roof cars added in 1912 may be subdivided into two groups, one of seventy-one cars with an over-all length of 44 ft., and one of 144 cars, 45 ft. in length over all, the only difference being in length of platforms. They were planned in general for service on the lighter trunk and crosstown lines and therefore were restricted in length to the dimensions above stated. These cars are interesting because they mark the adoption of the arch roof as standard car construction for Chicago.

An attempt was also made for the first time to break away from the use of four 40-hp. motors when equipment of somewhat lesser capacity would perform the service. Hence these cars have four-motor equipments, each motor rated at 35 hp. at 500 volts. They are also the first lot of cars to be built in the companies' shops since the 1907 ordinances. A plan, elevation and section are shown in Fig. 4.

The arch roof is supported by light-weight pressed steel carlines of sufficient depth to provide an air chamber for use with the motor-driven exhaust fan ventilation system, as will be seen from the cross-section. The concave-convex car sides are again employed with top and bottom wood side panels separated by a guard rail. The sash in these cars are made of brass as it was then evident that the steel sash used previously would not meet expectations. While the first cost of the brass sash was rather high, it was felt that this would be justified by reason of the saving in the cost of refinishing at overhauling periods. It was planned to let these sash take a natural finish, and thereafter no more work on them would be necessary.

SEAT SPACING AND EQUIPMENT OF 1912 CARS

The sectional plan shows the seating arrangement, and it will be noted that the cross-seats are placed on 30½-in. centers. This was done to provide the required seating capacity in the comparatively short car body and at the same time allow for a generous length of longitudinal seat cushions.

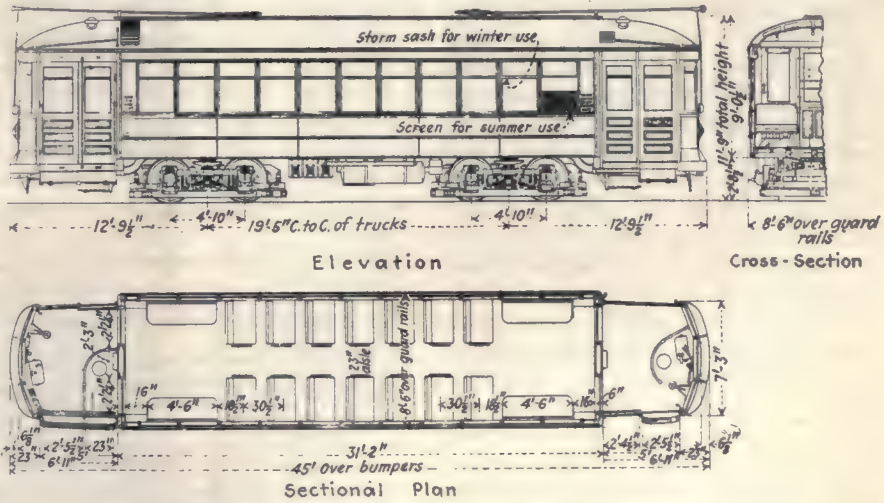


Fig. 4—General drawing of the first arch roof cars adopted in Chicago

The underframe for these 215 cars is of the plate girder type as is shown in Fig. 5.

The motor equipments were specially planned for these cars. It was desired to obtain a four-motor equipment which in capacity would be in keeping with the size of the cars. Formerly when a four-motor equipment was selected, practically the only choice for street railway service was a motor rating 40 hp. at 500 volts, whether the car weight to be handled (less motors) were 15 tons or 20 tons. Since these cars were to be comparatively light in weight, about 18 tons (less motors) as compared to former cars of about 22 tons (less motors), it was felt that a motor of somewhat less capacity, and therefore lower weight than those used on the large cars would be suitable. Motors rated at 35 hp. each at 500 volts were therefore secured, or a total of 140 hp. per car, which gives substantially the same rating in motors per ton of car weight for these cars as for the heavy cars. The motors were of the latest interpole ventilated type, and bridge control was used.

These cars have given satisfactory results in service but it is felt that because of the comparatively small platforms, they tend to show up to better advantage on lines where the traffic is not very heavy.

During 1911 new developments in car design known as the "near-side" car came out. One of the Chicago companies desired to make a thorough try-out of the "near-side" car and the Board of Supervising Engineers authorized a trial on a scale large enough to equip an entire line, as it was not thought a fair test to mix new and old types of cars on the same route. Accordingly 125 near-side cars were purchased in 1912.

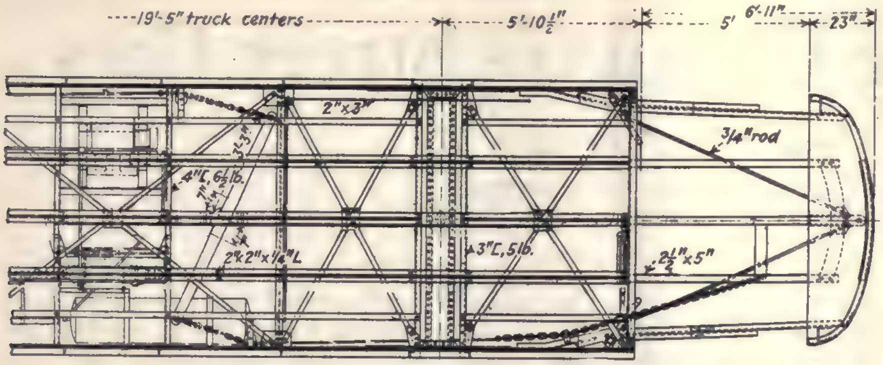


Fig. 5—Underframe construction of the 215 cars of 1912

These cars mark the introduction into Chicago of the maximum traction truck, and also the first lot of cars with the entrance as well as exit closed when the car is in motion. On these cars was also used for the first time in Chicago the ramp in the car floor, making possible lower car steps. An emergency exit door at the rear, under the control of the conductor, was provided. The wide aisle which is possible in a car using non-reversible seats is also a notable feature. The side sash raise and are so designed with the Gothic sash resting directly on the bottom sash that when the latter is raised it carries the former up with it. Provision is made in the roof structure so that both top and bottom side sash can be raised up to the level of the letterboard, making this a semi-open type car. As an additional convenience to the public these cars were fitted at the front end with special route signs of the roller type and illuminated at night. The arch roof used contributed to the light weight of these cars as compared to earlier cars. Other reasons for the light weight were: One platform only; maximum traction trucks; two-motor equipment, and single-end control.

CARS CONSTRUCTED WITHOUT THE CUSTOMARY BULKHEAD

These cars are also constructed without the customary bulkheads so that the platform, which is fitted with folding doors, closed when the car is in motion becomes virtually a part of the car-body space. The platform folding entrance and exit doors are operated by the motorman. The conductor is stationed opposite the entrance and against the platform side inclosing structure, and his duties are limited practically to the collection of fares.

The underframe of these near-side cars is of all-steel construction with cast-steel body bolsters. The design is a combination of girder and over-truss type, the overhang of the platform being carried largely by the over truss. Diagonal bracing is amply provided and thoroughly riveted in place. The crossings are of lattice bar construction which permits a somewhat stiffer member for equal weight as compared to rolled sections.

These cars have given good service although it is felt that they are not quite as efficient in handling heavy traffic as the large double-end equipment. It appears probable that their over-all length approaches the limit for practical use for operation as a single-end car, because it is not always possible to get good distribution of the passenger load and full use of the carrying capacity in the peak hours. The time for handling passengers also appears to be somewhat greater than for the large double-end cars. Single-end equipment is further handicapped by the necessity for loops or wyes at terminals.

In 1913 one of the companies added 100 more double-truck double-end pay-enter cars to its passenger equipment. These cars were constructed with arch roof and equipped with maximum traction type trucks. A general plan, elevation and section are shown in Fig. 6. The seating arrangement is somewhat different than that used in previous equipment, the plan being to provide the maximum possible seating capacity in the car, including the platforms. To accomplish this result the platforms are equipped with seats which are folded up out of the way in the rear end of the car. The platforms are provided with folding doors and steps which on the rear are manually controlled by the conductor. The motorman controls the front exit door as on previous equipment.

The arch-roof construction was adopted for these cars following its successful use on the 215 cars and the near-side equipment. The saving in weight and the light roof made possible by this design were strong factors in its continued use. To reduce step heights, the car-body floor is sloped downward from the bolsters to the end sills, saving about 3 in. in floor height. The slope is at the rate of about ½ in. to the foot and has been found satisfactory in service.

The cross-section shows the concave-convex car side design used again in these cars, and the wood panels are not covered with steel plates. The upper roof structure is constructed so that the lower side sash of comparatively great height can be raised up to the level of the

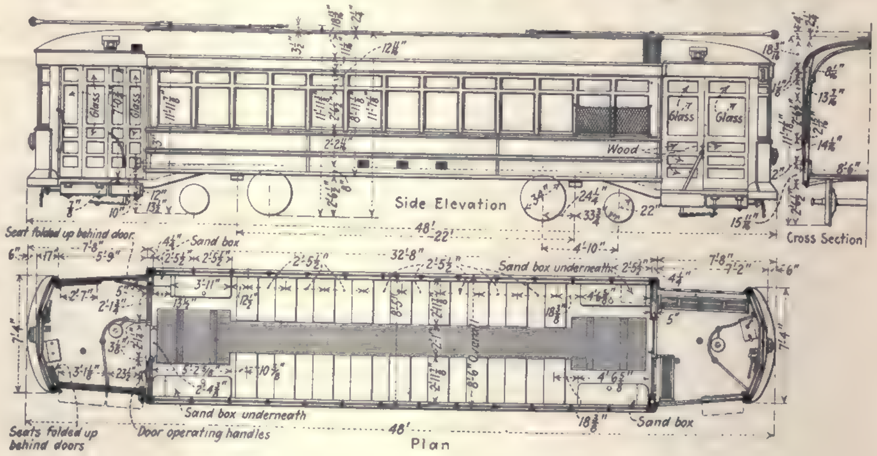


Fig. 6—General drawing of the 1913 cars

bottom of the upper or Gothic sash. This gives a maximum side window opening for summer operation.

200 CARS OF 1913-1914 WERE LARGER AND INTRODUCED STRAIGHT SIDES

By 1913, owing to the increase in business, the need of the companies for additional passenger equipment capable of rapidly handling the traffic on heavy lines was felt. It was therefore decided to purchase 200 more cars which should have the platform facilities and carrying capacity of the largest cars on the system. These cars were built according to the general plan, elevation and section shown in Fig. 7.

The arch roof is suported by pressed steel carlines of deep section similar to the 215 cars of 1912. This construction provides a light and stiff roof structure. The open space between the roof and the ceiling is used as the exhaust chamber of the motor-driven fan ventilation system. The plan shows the seating arrangement which is laid out to give maximum seating capacity and at the same time provide for the rapid movement of passengers. Folding platform seats accommodating a total of five passengers are installed on these cars. The double sliding doors in the body end bulkheads and the cross-seat spacing of 30 in. result in securing maximum seating capacity in the car body. The platform is arranged to facilitate the rapid movement of passengers, and in size is practically the same as that on the largest (1908) cars. The platform folding doors remain in the open position on the rear end of the car, which facilitates the rapid handling of passengers.

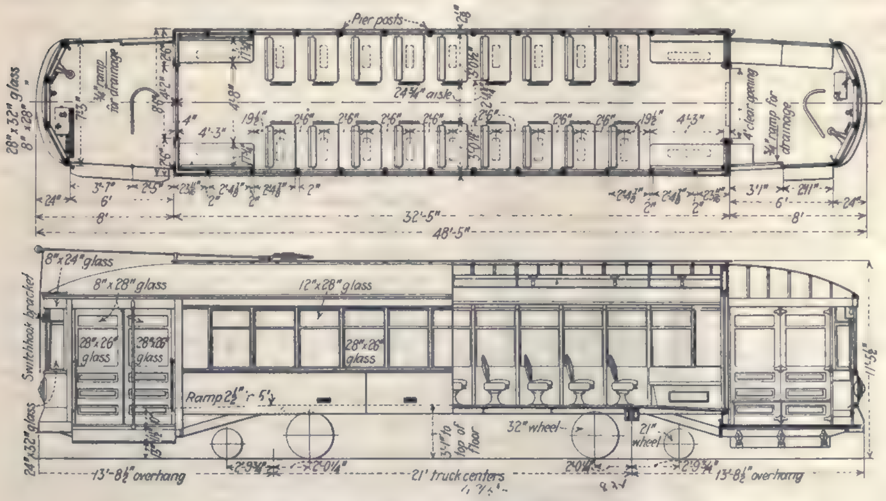


Fig. 7—Plan and elevation of the 200 cars of 1913-14

The folding step on the exit side of the front platform is operated in conjunction with the exit door, both of which are controlled by the motorman. The folding step on the entrance side is folded up with the closing of the folding doors so that on the blind side of the car there is no opportunity afforded for stealing a ride. A ramp of 2½ in. is built at each end of the body floor from the bolsters to the end sills to make the steps that much lower. The slope in this ramp is about ½ in. to the running foot and it has been found satisfactory in service.

These 200 cars are notable as they introduced in Chicago car design, the "straight side" body, in which the car side from the bottom sill to the windows is of steel and is also the load-carrying girder of the car framework. It is obvious that this construction makes possible the most economical car structure as to weight, because of the maximum depth of girder and the elimination of duplicate parts in the side framing.

The underframe for these cars is shown in Fig. 9.

These 200 cars were very carefully designed with a view to producing a car of the least weight consistent with good design, and the result is seen in the very low weight of less than 36,000 lb. for a complete car having the capacity of the largest equipment on the system. These cars have given satisfactory service in the efficient handling of very heavy traffic.

To provide the necessary equipment to meet traffic growth, 228 double-end cars of large carrying capacity and capable of handling the traffic on trunk lines were added in 1914-1915. These were very similar in exterior appearance to the 1913-1914 cars shown in Fig. 7. The floor plan is very similar to that used for the 100 cars added in 1913. Fig. 6.

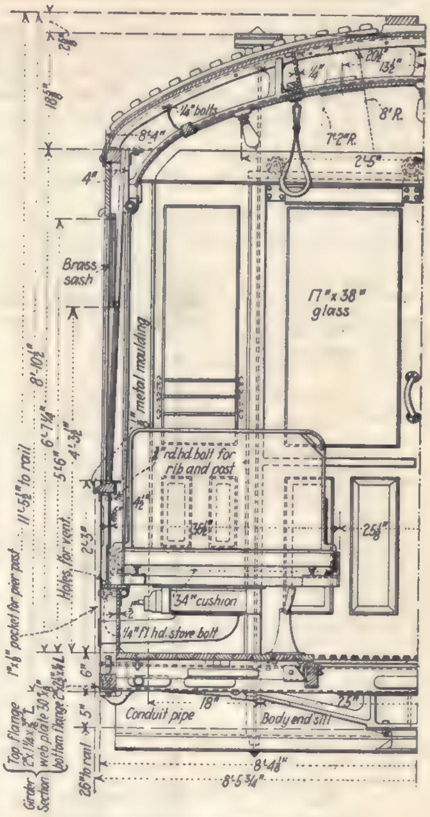


Fig. 8—Cross section of first straight-side car

The cross-seat spacing is 2 ft. 5½ in., in order to get the maximum seating capacity in the allowed body dimensions. The straight side car construction with steel girder from bottom sill to side window opening adopted in 1913 was again followed in this equipment. In order to provide low steps a 3-in. ramp was placed in the body floor from the bolsters to the end sills, the slope being approximately ½ in. to the foot.

The underframe is shown in Fig. 10. All load-carrying members are of steel and the body bolsters, following standard Chicago practice, are of cast steel. The underframe is thoroughly cross-braced so that it will withstand side swipes and vehicle collisions without getting out of alignment. The substantial and neat construction of this underframe is evident from the drawing which shows the strongly built platform structure, designed to carry the heavy loads of peak service without sagging.

The weight of these substantially built cars was kept to the reasonable figure of 40,180 lb. These cars have been operated on important routes and the service results have been satisfactory.

Following the cars just described,

there was built by the companies nineteen double-truck cars to replace those lost by fire or from other causes. These cars are very similar in general layout and design to the 228 cars just described except that four motor equipments were used instead of two motors, as the trucks and motors for four-motor equipments were on hand. No extended mention of this equipment is therefore necessary.

THE SAFETY CAR INTRODUCED IN CHICAGO

In 1920 the companies purchased ten so-called standard one-man single-truck safety cars for trial. They were placed in operation on outlying routes where the traffic was within their capacities. They have given quite satisfactory results. Experience with these has indicated, however, that they possess certain limitations. The important ones are:

1. Excessive time for passenger interchange due to single narrow doorway which must be used by both boarding and alighting passengers.
2. Congestion in the cars due to narrow aisle and limited space at the ends of the car for passenger movement.
3. Light framing construction which results in considerable damage even in comparatively light collisions.

It was therefore decided to construct and thoroughly try out in service a single-truck safety one-man car which would be free as far as possible from the above limitations and yet not exceed in weight that of the ten safety cars already in operation. A sample car was therefore designed under the direction of the superintendent of shops and equipment, with the approval of the board, and constructed in the company's West Side shops. A detailed description of this car was published in *Electric Railway Journal* for Jan. 14, 1922, page 65. The floor plan is shown in Fig. 11 and the underframe in Fig. 12.

The notable features of this car is the double doorway at the ends, providing for the simultaneous movement of entering and leaving passengers; operation of the folding doors for both doorways at the same time by one movement of the brake handle; a car width of 8 ft. in order to provide a wider aisle; and a seating capacity of thirty-six with a total weight of only 16,375 lb. In order to insure the proper use of the doorways by passengers and to simplify the work of the operator, the exit passageway is provided with a swinging gate or barrier, opening outward only, and released by the weight of a passenger standing on a floor plate or treadle. This treadle is located so that when a passenger desires to alight he must stand on it as he approaches the exit door. By the use of longitudinal seats at the ends of the car body and a wide aisle, provision was made for the expeditious and easy movement of passengers. The seats have spring cushions and thin padded form-fitting backs. To improve the appearance of the car the side framing was tapered toward the ends from the second body side post, and the curvature of the platform bumper and dash was increased. This car, while longer and wider than the single-truck safety cars purchased, weighs less. The reduction in weight was accomplished by close attention to all details of design and by a redistribution of weight as compared to the cars purchased. In this sample car more weight was put into the bottom framing and less into the superstructure, resulting in a lighter and stronger construction and a car better able to withstand

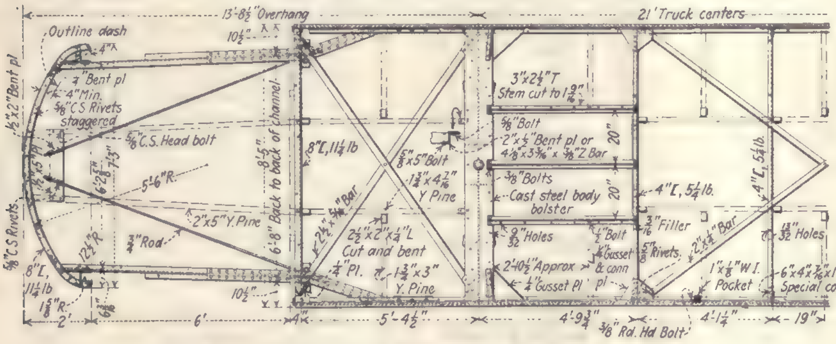


Fig. 9—Underframe of first straight-side car, 1913-14

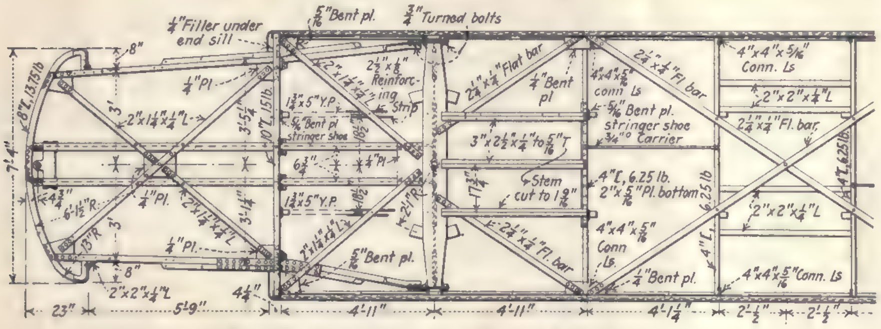


Fig. 10—Underframe of 228 cars of 1914-15

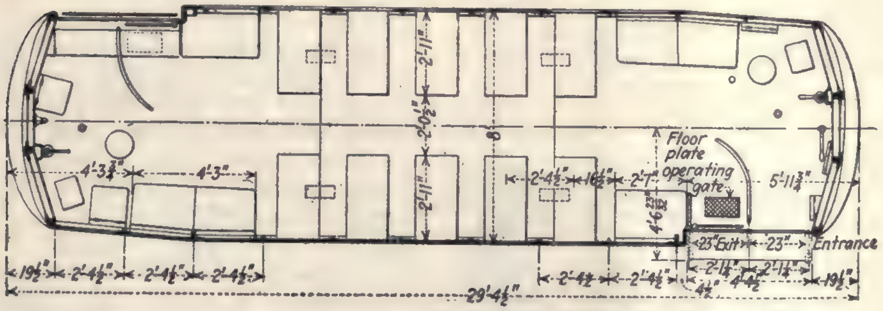


Fig. 11—Floor plan of one-man single-truck safety car designed by Chicago Company

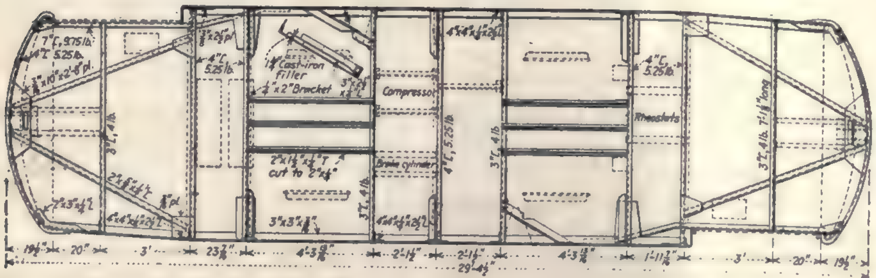


Fig. 12—Underframe construction of single-truck one-man safety car designed in Chicago

collisions with vehicles and other equipment.

This sample single-truck, double-doorway, one-man safety car has been in service since September, 1921, and has satisfactorily overcome the limitations of the ten purchased safety cars. At points of heavy passenger interchange, those entering and leaving are separated with no special supervision from the operator and the length of stop is shortened as compared to the single-passageway car.

TRAILERS INTRODUCED IN 1921 WITH 101 CARS

A thorough investigation of trailer operation having been made, it was decided, with the approval of the board, to build a double-truck trailer in the company's shop, and give it a thorough service trial. The car was built and placed in service in June, 1920, and was in trial operation for more than nine months. It proved successful and so fifty additional cars of the same design were built in the company's shop and fifty others purchased. The design of these cars was thoroughly treated in an article in *Electric Railway Journal* for July 17, 1920, page 110.

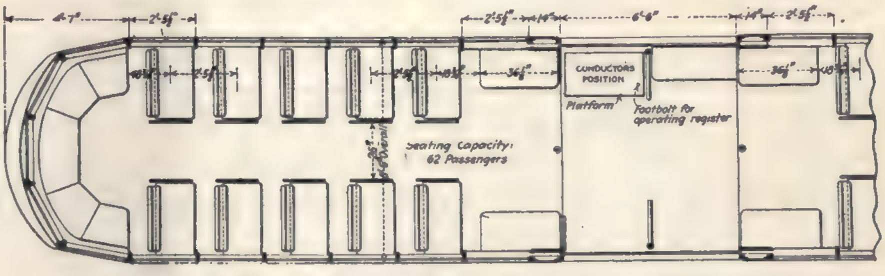
For hauling trailers for peak service only it was thought that one of the large double-truck cars of the 1908 class would have the necessary reserve capacity. One of these cars was equipped with couplers, air-operated doors, and the other electrical and air brake equipment required and it proved satisfactory for hauling a trailer in rush-hour service.

The trailers are of the double-truck, double-end, center-entrance type. The general floor plan is shown in Fig. 13 and the underframe construction in Fig. 14. The total weight of these cars, completely equipped, less passengers, is approximately 26,000 lb.

The plan shows the general arrangement of the seats and the loading platform or well at the center of the car. The loading platform or well, 15¾ in. above the top of rail, is of generous dimensions and is reached with one step so that passengers are very rapidly handled. The double sliding doors, each operated by a pneumatic engine, are controlled by a hand valve located convenient to the conductor's position. A ramp in the car floor of approximately ½ in. per foot makes possible the easy step from the street into the well.

The underframe is of the deep plate girder type with steel framing around the center door opening. Crossings are of steel sections and body bolsters are of cast steel. Ample cross bracing is provided, and the rounded end framing is substantially built so as to stand up in collision. The superstructure above the belt rail is constructed principally of wood, following the usual design in cars for Chicago service. These trailers have met with the approval of the riding public and have contributed in no small degree to a considerable improvement in service, especially during the peaks.

While the one-man single-truck safety car built by the company has given satisfactory results, it was felt that the field of the single-truck car under Chicago service conditions is rather limited. It is also impractical to get a single-truck car which will ride as easily as a car equipped with double trucks. Furthermore, the larger car body which can be mounted on double trucks gives the carrying capacity required to meet the wide range of operating conditions which exist in large cities. It was therefore decided to construct in the company's shops a double-truck, double-end, one-man safety car and



Conductor's Position
Platform
Footbolt for operating register
Seating capacity: 62 Passengers

Fig. 13—Floor plan of 101 Chicago trailers

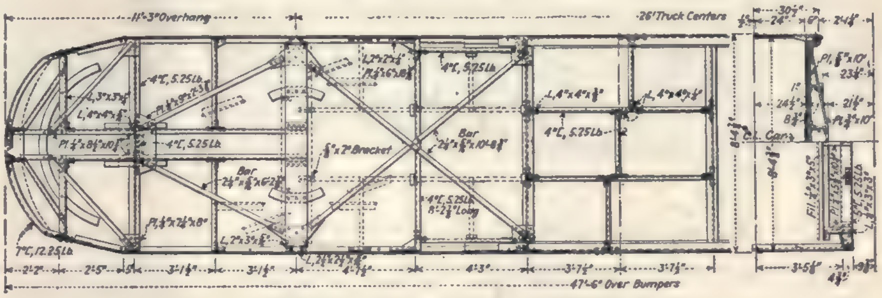


Fig. 14—Underframe construction of Chicago trailers

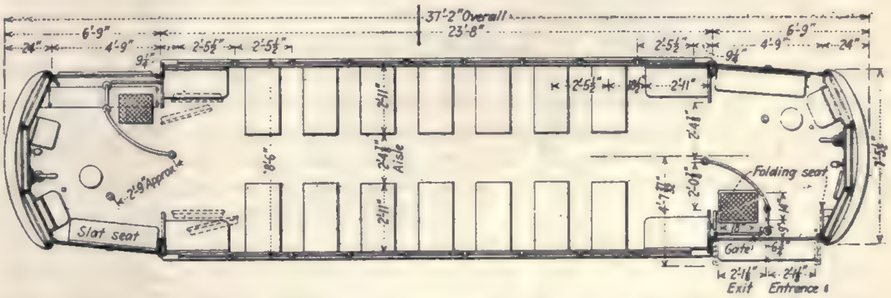


Fig. 15—General plan of sample double-truck one-man safety car. The forty-five new one-man cars will be the same except for lengthening by one window and one more pair of cross seats and the use of maximum traction trucks

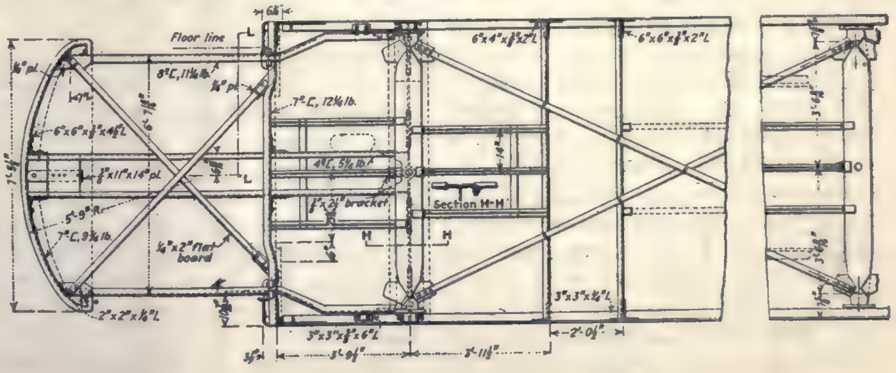


Fig. 16—Underframe construction of double-truck Chicago safety cars

give it a thorough service trial. This car was described and pictured in detail in *Electric Railway Journal* for Jan. 14, 1922, page 65.

The design of this car made under the direction of the superintendent of shops and equipment and approved by the board, incorporates the good features of the single-truck, one-man safety car built by the company. A general plan of the sample double-truck, one-man safety car is shown in Fig. 15 and the underframe in Fig. 16.

In this first double-truck, one-man car it was decided to try out a four-motor equipment. In arriving at the over-all length of the car body and hence its passenger capacity, it was felt that this dimension must be enough to make the investment in double-truck equipment worth while and yet not so great as to discourage full use, by the passengers, of the capacity in the rear end of the car. It was believed that the dimensions as shown would meet the requirements.

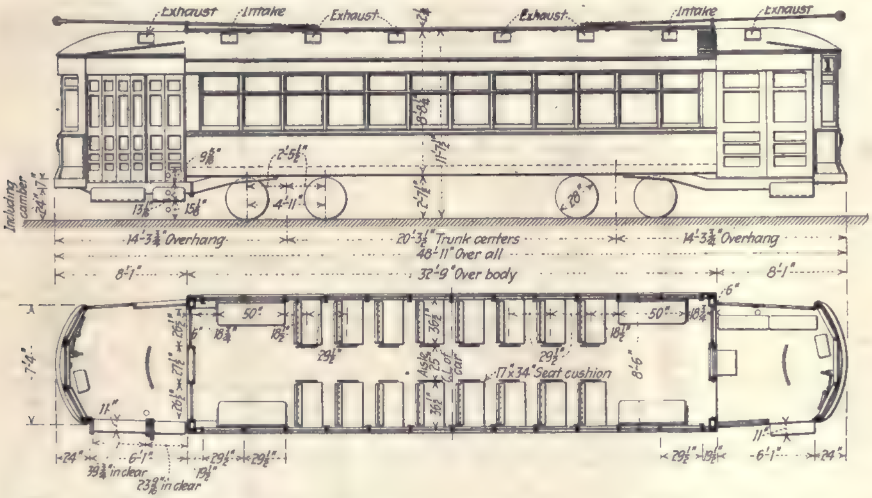


Fig. 17—Plan and elevation of sixty-nine two-man cars now under construction for Chicago Surface Lines

The general construction details, embodying a straight steel girder side car, follow closely those of the single-truck car built in the shops except where modified by the fact that the structure is of greater length and is for mounting on double trucks. Post spacing was increased 1 in. over the single-truck construction, as it was felt that in a double-truck car seat centers should be substantially the same as on the other double-truck equipment already in service. The over-all width was made about 6 in. more than the sample single-truck car so as to give the aisle width necessary in a long car body where entrance and exit are at the same end and passenger movement frequently occurs simultaneously in both directions through the car. The steel post and letter-board construction which was successfully used in the one-man car was followed in this double-truck design.

To provide an easy access car, the platform floors were dropped 6 in. below the level of the car body floor, which gives easy steps from platform to top of rail. Careful attention was given to all details in the design in order to secure a car of the lightest possible weight and at the same time sacrifice nothing required for strength or for reasonable upkeep cost.

This car was originally equipped with a swinging gate or barrier, in the platform exit passageway, which is controlled by a treadle in the platform floor as previously described in connection with the single-truck, one-man safety car built by the companies. As a result of many observations a further development resulting in an improved arrangement has been worked out. This consists in the elimination of the swinging barrier or gate and the use of the exit door itself as a barrier, it being operated by an independent air engine which is automatically controlled by the floor plate or treadle.

Experience with this car in service has shown that fairly heavy passenger loads are handled with little crowding and confusion, and the exit-door equipment has functioned quite satisfactorily. It is believed that this new exit door arrangement goes far toward the solution of difficult problems connected with the operation of one-man cars.

As a result of the performance of this sample double-truck, one-man car, it has been decided to build additional equipment of this design. Plans were recently approved for the construction of forty-five such cars.

Experience with the first car indicated that a car of somewhat greater capacity would probably be desirable and practical, and therefore the forty-five additional cars will be increased in length by the amount necessary to add one more cross-seat in the car body. Otherwise, the details are substantially the same as for the first car built. These cars are now under construction in the company's shops.

It has been decided, however, to adopt a two-motor equipment for these forty-five additional cars because of saving in weight, energy consumption, cost of motor maintenance and first cost. This decision was strongly influenced also by the fact that the same motor can be used as for the sixty-nine large double-truck, four-motor cars which are being built to replace the equipment lost in a fire early this year. Thus only one type of motor equipment will be added to the system instead of two types. Five of these sixty-nine double-truck cars will be so designed and equipped that trailers can be hauled in all-day service, while the remaining cars will have the capacity and equipment for such service, except that they will not be fitted at this time with couplers. A general plan, elevation and section of these sixty-nine latest two-man cars is shown in Fig. 17.

DETAILS OF 1922 TWO-MAN CARS

The total weight, completely equipped, less passenger load, is expected to be approximately 45,500 lb. The plan shows the seating arrangement laid out so as to provide clearance space around the doors at the car ends, standard Chicago practice, and so spaced as to give the maximum capacity in the car body. Platform seats with a total capacity of six passengers are placed as shown. The platform length is such as to make possible a wide entrance passageway and an exit opening of ample dimension. The platforms will be equipped with folding doors, closed when the car is in motion and operated by pneumatic engines. Body-end bulkheads with sliding doors typical of Chicago equipment will be installed as tests have indicated that such a design provides a car more comfortable and one much easier heated than a design without end bulkheads.

Study and experience of Chicago Surface Lines on this subject was partly related in last week's issue and is concluded herewith. The proper determination of heater capacity, results obtained with thermostatic control and development of a radiation constant are among the points which are discussed in this section.

Heating and Ventilating Chicago Street Cars

By CHARLES GORDON
Engineer of Equipment
Chicago Surface Lines

Standard exhaust and intake automatic ventilation as installed on arch roof Chicago cars

THE primary object of all heating tests is, of course, to obtain data which will enable determinations to be made of the heating capacity required for a given type of car. Checking the capacity of a given heater equipment installed in a car to determine whether or not it is suitable for maintaining certain required conditions involves a great many variables and, to assure an average result, requires a number of observations taken under different conditions and the elimination of any unusual factors which would not represent the general conditions of service.

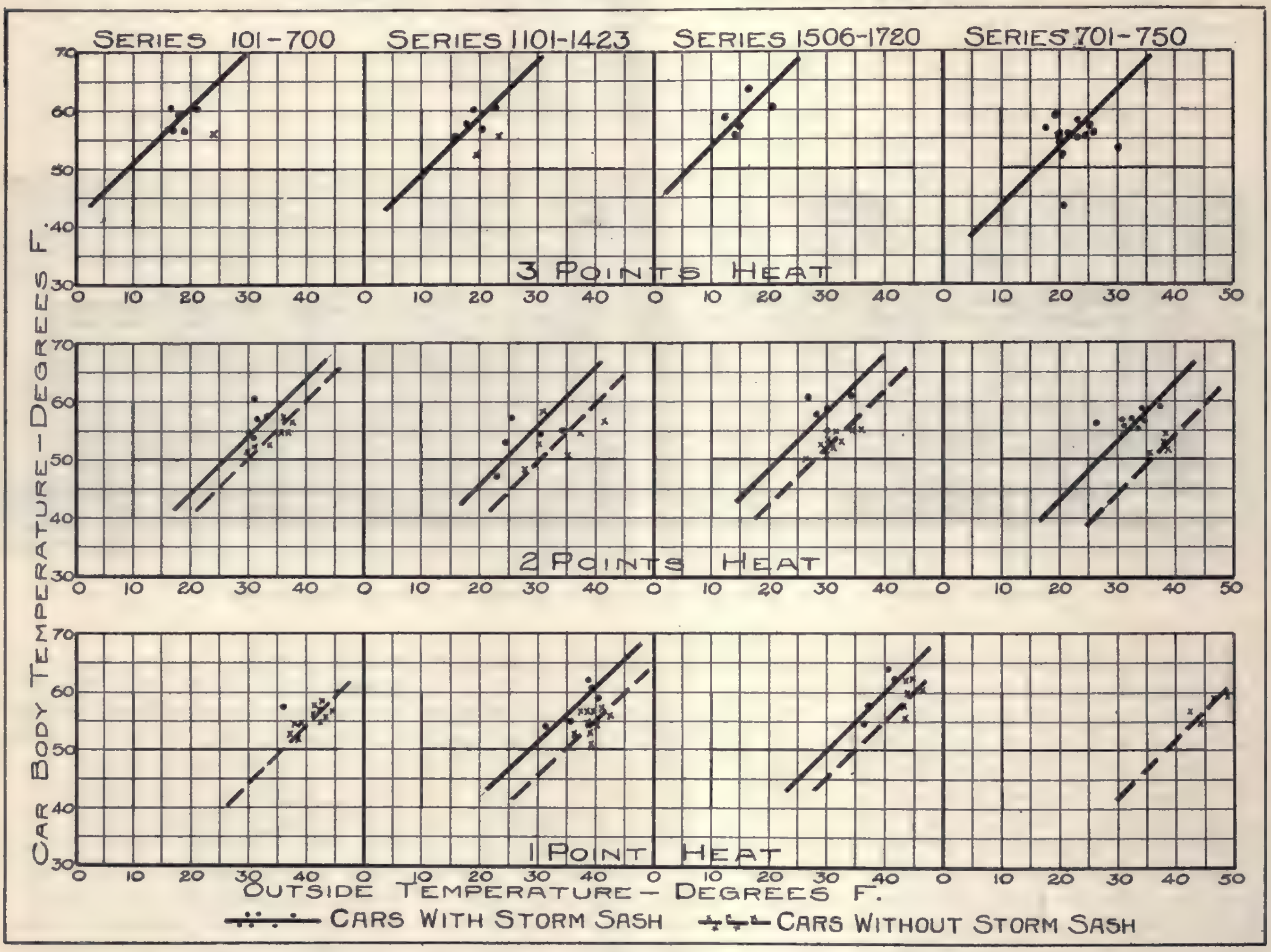
Checks of this kind in Chicago were of two general classes. The first class consisted of observations on cars in service carrying passengers under the conditions found existing while the observer was on the car. By carefully noting all factors which might influence the results obtained, it is possible to accumulate a quantity of data from observations of this kind, which enable the results obtained to be corrected to a common basis, for the purpose of comparing the heating equipment in different classes of cars.

The second class of observations which were made on a great many different types of equipment are represented by tests in which the cars were allowed to stand in the open under certain conditions of weather and ventilation, while periodic observations were made of the temperature rise within the car above the surrounding outside atmospheric temperature. The elimination of the variable factors encountered in service, namely, opening and closing of doors, starting and stopping of car, etc., enables a very careful comparison to be made of the relative capacity of different heating equipments, or a determination of the relative heater equipment capacity required for different types of cars. It was found by carefully analyzing the results from a large number of tests of this character that it was possible to predict the average operating temperature in service from these standing tests. This will be described in more detail below.

The illustration on page 506 represents graphically the results obtained from more than 225 sets of observations conducted on various types of cars in service under different conditions of weather and temperature, for the purpose of determining average temperature rise above atmosphere, which could be maintained by the existing equipments. Observers were assigned to this work and readings taken throughout a round trip on each car entered. They were equipped with test thermometers, one of which was mounted on a bracket designed to be quickly fastened on the storm sash catches so that the thermometer could be read from the interior of the car through the window. A second test thermometer was mounted inside the car adjacent to the car thermometer and a record was made every five minutes of the temperatures observed. Notes were carefully made of all related conditions which would affect the results, such as number of passengers, total time doors were open in seconds during the round trip, window openings, wind velocity and direction of motion of car, condition of ventilating apparatus, etc. By taking the observations for a complete round trip on each car, it was possible to eliminate the effect of a number of variables.

The original data obtained were corrected, averaged and summarized for each round trip, so as to be in form for comparison on a common basis. These average data are compiled in the illustration which is presented below for four different types of cars and are only typical of similar data collected for other types of equipment. The data are arranged in three groups representing observations made on cars where three, two and one point of heat respectively were being used. Under the more moderate temperature conditions obtaining in the fall and spring, a number of observations were made on cars with and without storm sash. The data are therefore further subdivided according to this classification. The solid line in each set of observations represents cars equipped with storm sash, whereas the broken line is made up for observations obtained on cars not equipped with storm sash.

It was one of the primary objects of these observations to determine the average rise above outside atmospheric temperature which could be expected with the heater equipment then installed in the different classes of cars. These observations were for the double purpose of determining, first, whether the requirements of the city ordinances were being met with the equipment in service, and second, if the requirements were not being met, what additional heater capacity was necessary. In the case of one group of cars, it will be found by a study of the data presented, that the ordinance requirements were not being met at that time. This was for the car series 701-750, which were of all steel construction, and in which additional heating equipment was installed as a result of these tests. In the illustration above outside temperatures between 0 and 50 deg. F. are plotted as abscissa, while body temperatures between 30 deg. and 70 deg. F. are plotted as ordinates. Each point in a group represents the corrected average car temperature for a given type of car at the average outdoor temperature encountered during the observations. Since it was impossible to obtain all the desired combinations of average car temperature and outdoor temperatures desired in these tests, it was necessary, in order to get a readily comparable picture of the results, to convert the data to some fixed outdoor temperature. This temperature was taken at 10 deg. F. since it is the critical point mentioned in the heating ordinances. If a straight line is drawn through each group of results in a position representing approximately their average, at an angle of 45 deg., any point on this line represents a fixed rise above the outside temperature. The purpose of the straight line plotted as shown is to bring all the recorded data to the same basis as regards outdoor temperature. Since the rise above outside temperature is a fixed value in degrees for a given combination of conditions, this arrangement forms a readily interpreted picture of the average results for each equipment. In the case of the steel cars, 701-750



Service checks of car temperatures under various conditions as indicated mentioned above, it is apparent that since the 45 deg. line falls below the intersection of lines drawn through 10 deg. outdoor temperature and 50 deg. car temperature (the ordinance requirements) more heater capacity was shown to be required. The data are of further interest in pointing out in quite a striking way the effect of storm sash on the results.

In Figs. 8, 9 and 11 are presented graphically the results of standing tests which are typical of a great many tests of this kind conducted for the purpose of investigating some of the various factors which influence the results obtained with any given equipment. Because of limitation in space, these curves are presented with just a brief note of explanation, since the data included are almost self-explanatory. In passing, however, it is well to note that Fig. 8 shows in an interesting way the effect of various deck sash openings. Fig. 11 illustrates the results

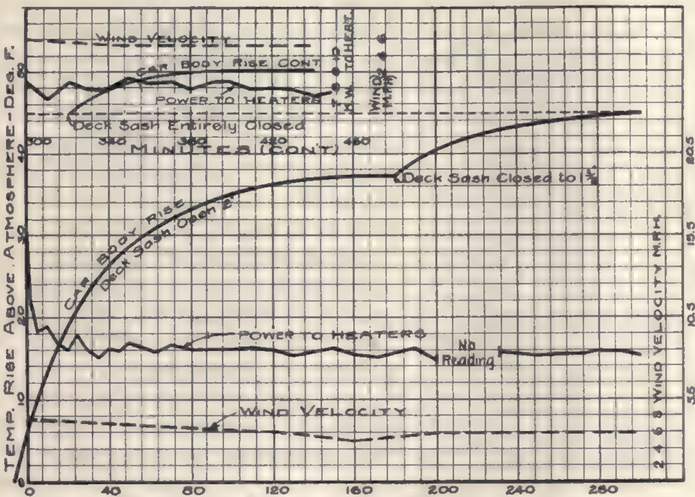


FIG. 8

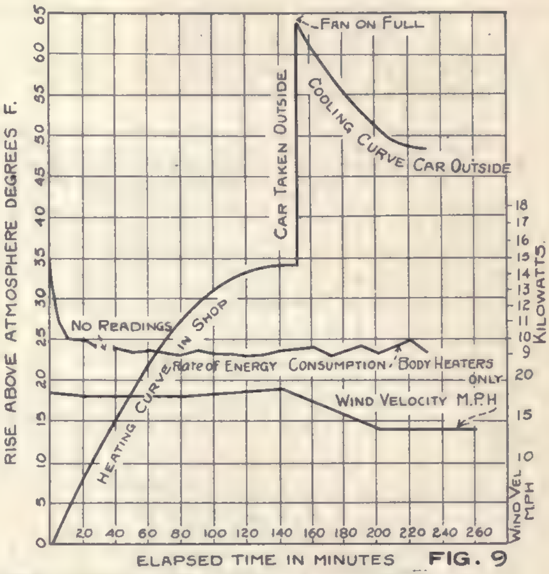


FIG. 9

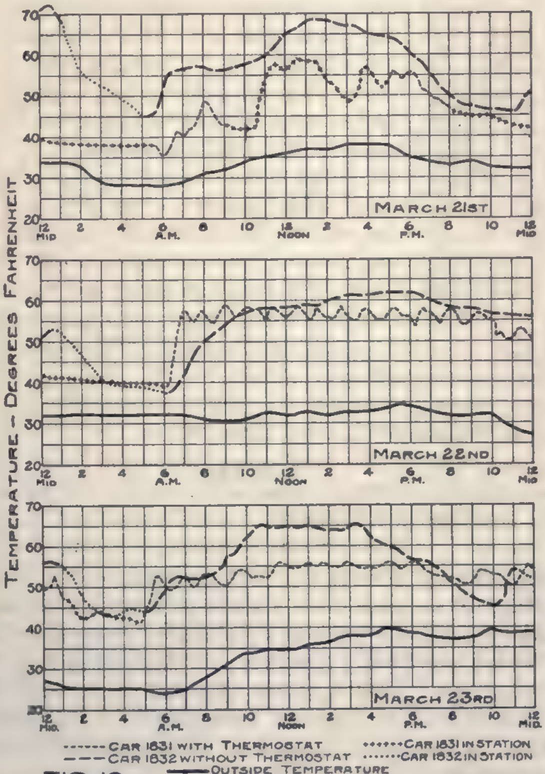


FIG. 10

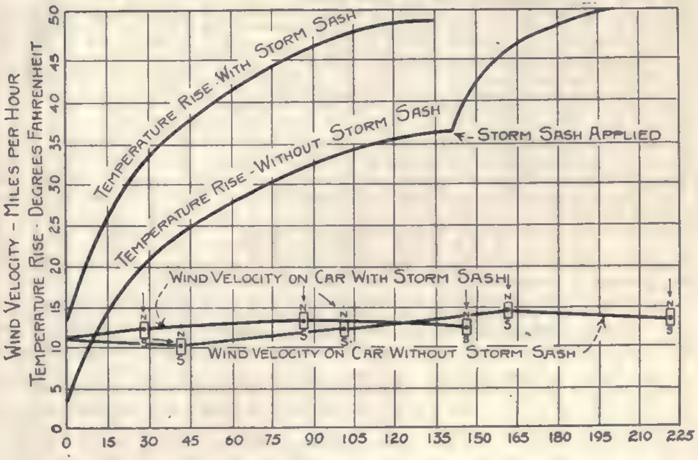
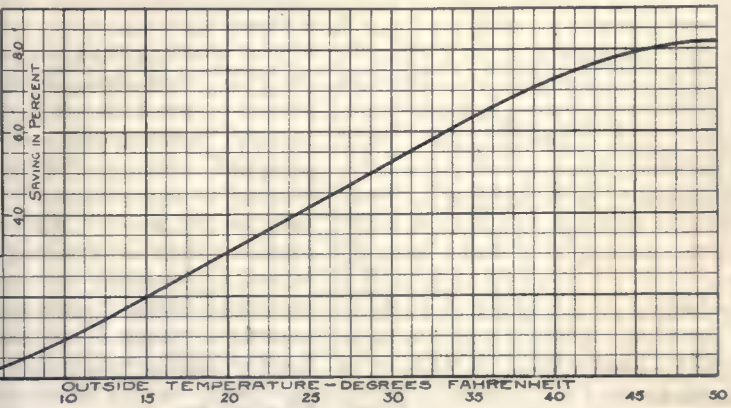


FIG. 11



THERMOSTAT TEST
CARS 1831-1832

FIG. 12

Fig. 8—Effect of open deck sash on car temperature, car standing.
Fig. 9—Effect of storm sash on car temperature, car standing.
Fig. 10—Car heating and cooling test, car standing.
Fig. 11—Effect of thermostats in maintaining a uniform temperature in the car.
Fig. 12—Saving in heating energy by use of thermostats.

obtained on one car with and without storm sash and Fig. 9 gives a graphic picture of a heating and cooling curve with the car standing, showing the similarity in the shape of these two curves. In this latter test the car was heated in the building to a temperature rise of 34 deg. above the surrounding air in the room and then run outdoors, the ventilating fan turned on and periodic observations made to determine the fall in car temperature. In passing over these standing rise tests, it may be well to point out the time involved in attaining the maximum temperature rise which the heater equipment is capable of maintaining once this rise has been obtained. It is evident that if these cars are placed in service cold, it will require even a longer time to obtain the maximum temperature which will represent a balanced condition. This points out very emphatically the necessity for preheating cars before placing them in service in extreme weather, if satisfactory heating conditions are desired.

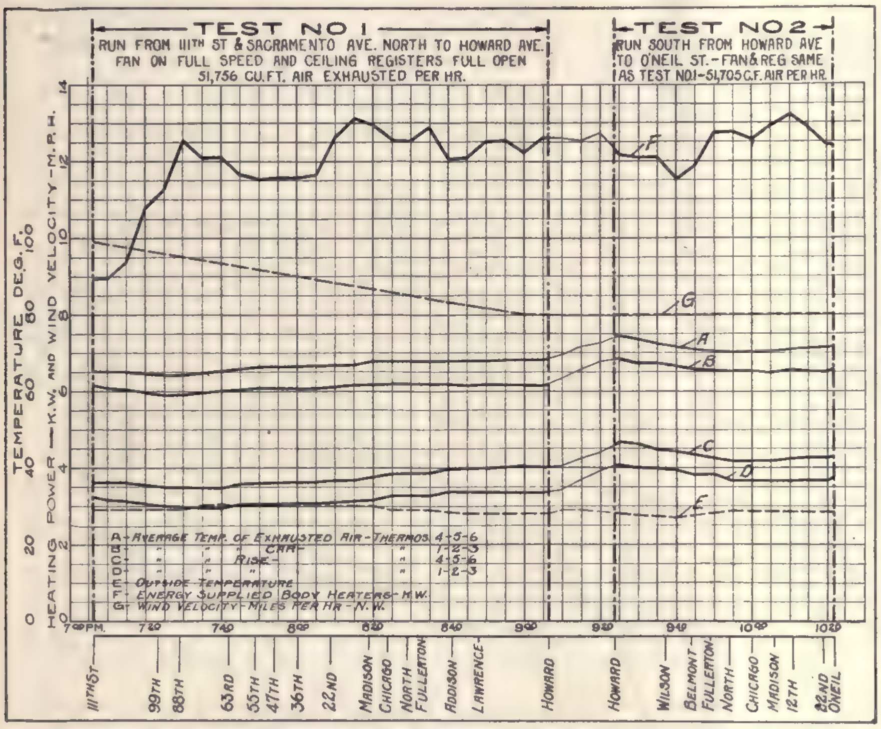


Fig. 13—Typical sample of data recorded in determining relation between radiation constant and volume of air exhausted by ventilating system

Chicago was one of the pioneers in the use of thermostats for regulating car-heating apparatus. A number of very interesting and exhaustive tests were conducted at various times as a result of which all passenger cars are now equipped with this device.

Fig. 10 gives a very clear picture of the results taken from one set of such tests, in which two cars, one equipped with thermostats and the other not so equipped, were followed carefully throughout an entire winter. These cars were prepared for the test by installing watt-hour meters in the heater circuits and graphic thermometers inside the body. The data in Fig. 10 are plotted directly from these graphic thermometer readings. Although the thermostats used in the tests from which these data are taken were by no means as well developed or as sensitive in their action to changes in temperature as some of the more modern apparatus now available, the curves show to a striking degree the desirability of including this form of regulator as part of the heating equipment.

Fig. 12 furnishes a further basis for this conclusion. Here the curve shown represents the saving in energy consumption on the car equipped with a thermostat, expressed in percentage of the energy used on the car not equipped. It is apparent that the greatest saving obtained, expressed in percentage, should be at the higher outside temperatures, when it is necessary to use the heater equipment only a comparatively small portion of the time. The fact that the saving on the tests from which these data were taken reaches 0 at approximately 5 deg. outdoor temperature indicates that the continuous operation of all the heaters in this car gave an average car temperature rise of 45 deg. F. The thermostats were set to cut off the car heaters when the temperature within the car reached 50 deg. F.

STUDY OF RADIATION CONSTANT

The radiation constant for a car expresses the heating energy lost through the exposed walls, in British thermal units per square foot of exposed surface, per degree Fahrenheit difference in temperature between the interior and the exterior atmosphere. From time to time during the progress of the investigations carried on to determine the characteristics of various types of heater equipment, as well as the effect of various types of car construction on these characteristics, a great many calculations were made for the purpose of checking the experimental results obtained, and also for the purpose of predicting the effect of certain changes under consideration. In all such calculations it was found that although a reasonably close check could be made with experimental results by applying radiation constants obtained both from standing and service tests when the amount of air exhausted by the ventilating apparatus was comparatively small, it was nevertheless impossible to obtain a check between calculated and experimental data when the quantity of air interchanged by the ventilating apparatus was large. In calculations of this kind, the total heat loss from the car consists of that transmitted through the walls and radiated from exterior surface, added to the heat carried off with the air drawn out by the ventilating apparatus.

To determine the total heat lost through the walls of the car by the application of predetermined radiation constants obtained in tests conducted for this purpose was a comparatively simple matter. It was also a simple calculation to determine the total quantity of heat carried off with a given quantity of air heated to a given temperature. However, when these two calculated quantities of heat lost were added together, it was invariably found that they indicated a required heater capacity far in excess of that which experiment showed to be necessary to maintain a given temperature rise within the car body. This recurring discrepancy between calculated and experimental results led to a carefully planned test designed for the purpose of determining the effect on

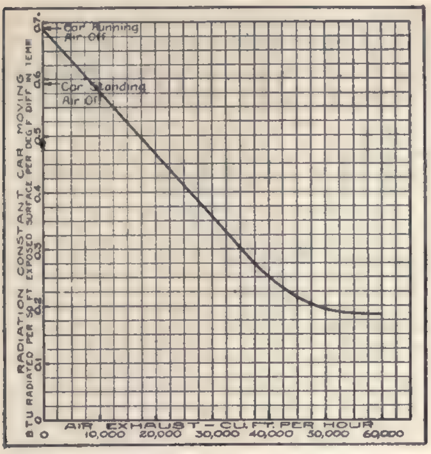


Fig. 14—Relation between radiation constant and volume of air exhausted by ventilating fan

the quantity of heat lost through the walls of a car of drawing a large quantity of air through the comparatively small space within the car.

Fig. 13 is a graphic log of one section of this test. It illustrates the character of data obtained. Each section of the test was run for a sufficient period of time to insure the balancing of temperature conditions. In addition, to obtain a check on the results, each section of the test was run in duplicate.

Briefly stated, the object of this test was to determine the relation between the variation, if any, in the radiation constant and the quantity of air exhausted by the ventilating fan. The detailed data, which are entirely too voluminous to be presented here except in this brief way, were finally compiled so as to give the curve in Fig. 14, which shows very strikingly that the quantity of heat lost through the walls of the car during forced ventilation falls off very materially as the quantity of air drawn in the car increases.

It is at once apparent that this curve is of extreme importance in connection with any heating calculations applied to cars where the volume of air interchanged in a given period of time is large compared with the total volume of the interior of the car. It strikingly points out the difference between the heat loss from a relatively small interior such as is represented by a street car, where the quantities of air used for ventilation are so large that the currents formed along the walls are of sufficient velocity to interfere with the normal transmission of heat from the air of the interior to the material of the wall, through which it must be conducted before being radiated to the surrounding atmosphere, as compared with building ventilating practice where the spaces being ventilated are very much larger in comparison with the number of occupants and the volumes of air required.

In order to illustrate the method of compiling the data, the calculation below shows the method for determining one point on the curve of Fig. 14. It is taken from the data obtained in test No. 2 of Fig. 13.

The applications of the curve given in Fig. 14 are very interesting. Fig. 15 is a graphical representation of the conditions existing when various quantities of air are exhausted from a car carrying passengers, and when the heat losses are theoretically balanced for each quantity of air exhausted. This set of curves is also based upon carrying a sufficient number of passengers at each point, so that each is being supplied with 750 cu.ft. of air per hour.

The curve marked "Radiation Constant" is practically a duplicate of the curve in Fig. 14. The curve marked "Kilowatts Radiated" represents the variation in heat loss through the walls of the car as the quantity of air exhausted is increased, and is obtained simply by multiplying the radiation constant for each point by the temperature rise within the car, which is taken as 40 deg. F., and by the total effective square feet of radiating surface, transforming, of course, British thermal units into kilowatts on the basis of the mechanical equivalent of heat, namely, 3,412 B.t.u. = 1 kw.-hr. The curve "Kilowatts to Heat Air," represents the total amount of heating energy carried off by the exhausted air. The curve "Kilowatts Supplied by Passengers" represents the heating energy furnished by the bodily heat of the passengers within the car, on the basis of 400 B.t.u. per passenger per hour. The curve "Total Kilowatts, No Passengers Carried" is the arithmetical sum of the "Kilowatts Radiated" curve and the "Kilowatts to Heat Air" curve, while the curve "Total Kilowatts Required When Carrying Passengers" is the difference between the "Total Kilowatts, No Passengers Carried" curve and the "Kilowatts Supplied by Passenger" curve. The shape of this last curve illustrates the value of thermostat control. Under the theoretical conditions assumed in these calculations, it is apparent that the quantity of heat required from the car heaters actually decreases as the number of passengers increases, and as the ventilation is increased, so as to maintain a constant interchange of 750 B.t.u. per passenger, up to a point where the air interchange reaches approximately 45,000 cu.ft. per hour. The accompanying tabulation of calculations illustrates the method of preparing the curves in Fig. 15.

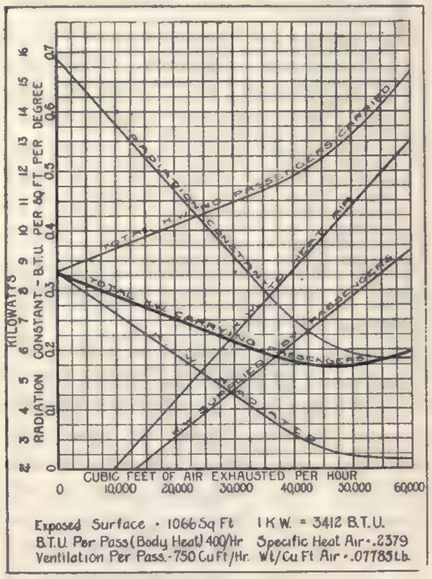


Fig. 15—Heat balance in car carrying passengers, showing variation in amount of heating energy required with passenger load

HEATING AND VENTILATING CALCULATIONS

Calculations based on a temperature rise from 10 deg. to 50 deg. F. = 40 deg. F.

1. Exhaust air—cu.ft. per hour	0	10,000	20,000	30,000	40,000	50,000	60,000
2. Radiation constant	0.69	0.577	0.467	0.355	0.248	0.193	0.185
3. Exposed area = 1,066 sq.ft.							
4. Temperature rise = 40 deg. F.							
5. Square feet-degrees = 42,640							
6. B.t.u. radiated per hour	29,422	24,603	19,973	15,137	10,575	8,230	7,888
7. Kilowatts radiated per hour	8.62	7.21	5.85	4.43	3.10	2.41	2.31
8. Weight per cubic foot, air at 50 deg. = 0.07785 lb.							
9. Total weight of air in pounds	0	778.5	1,557.0	2,335.5	3,114.0	3,892.5	4,671.0
10. Specific heat of air = 0.2379 B.t.u. per pound							
11. Total B.t.u. to heat air	0	7,408	14,816	22,224	29,632	37,040	44,448
12. Total kilowatts to heat air	0	2.17	4.34	6.52	8.68	10.86	13.03
13. Total kilowatts from heaters when no passengers carried = (7) + (12)	8.62	9.38	10.19	10.95	11.78	13.27	15.34
14. Passengers that could be carried with each receiving 750 C.F.H.	0	13.3	26.6	40	53.3	66.7	80
15. B.t.u. furnished by passengers at 400 B.t.u. each	0	5,320	10,640	16,000	21,320	26,680	32,000
16. Kilowatts furnished by passengers	0	1.56	3.12	4.69	6.25	7.83	9.38
17. Kilowatts to be furnished by heaters to maintain 40 deg. rise	8.62	7.82	7.07	6.26	5.53	5.44	5.96

How Stores Are Accounted for on the Chicago Elevated Railroads

Organization, Duties of the Various Departments and System of Stores Operation Are Described, Together with Illustrations of the Various Forms Necessary for Carrying Out the Work

By E. E. KRETSCHMER
Purchasing Agent
Chicago Elevated Railroads

THE Chicago elevated system includes four railroads operating as separate companies and keeping separate accounts. Four storerooms and three storage yards are necessary. Each storeroom is in charge of a storekeeper. The store department clerical force for the entire system is located in the office of the general storekeeper. An accompanying illustration shows the organization maintained.

Some of the duties of the store department include the maintenance at all times of a sufficient supply of material on hand to meet the requirements of the various departments of the railroad and to receive, check delivery, store and safely care for as well as account for and issue on requisition all material.

It is essential that the store department keep the stock of materials at a minimum, otherwise the company's funds will be tied up so as to make a large yearly turnover. In order to give the maximum of service to all other departments, the closest co-operation of all is necessary. Where materials become obsolete or overstocked, these are reported promptly so that they may be disposed of to the best advantage. It should be remembered that on a railroad system the size of the Chicago Elevated Railroads a great variety of material is required. There are various types of motors, electrical equipment, cars, etc., for which repair parts must be available, and a large number of these parts are more or less special A railway storekeeper cannot always work to a definite schedule as might be the case with a manufacturing concern where a definite manufacturing program can be outlined.

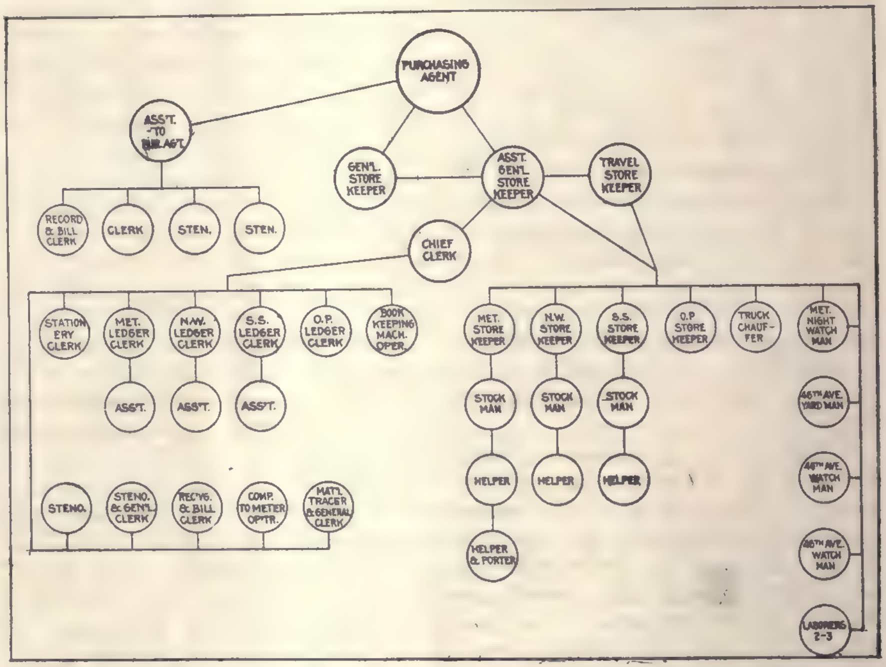
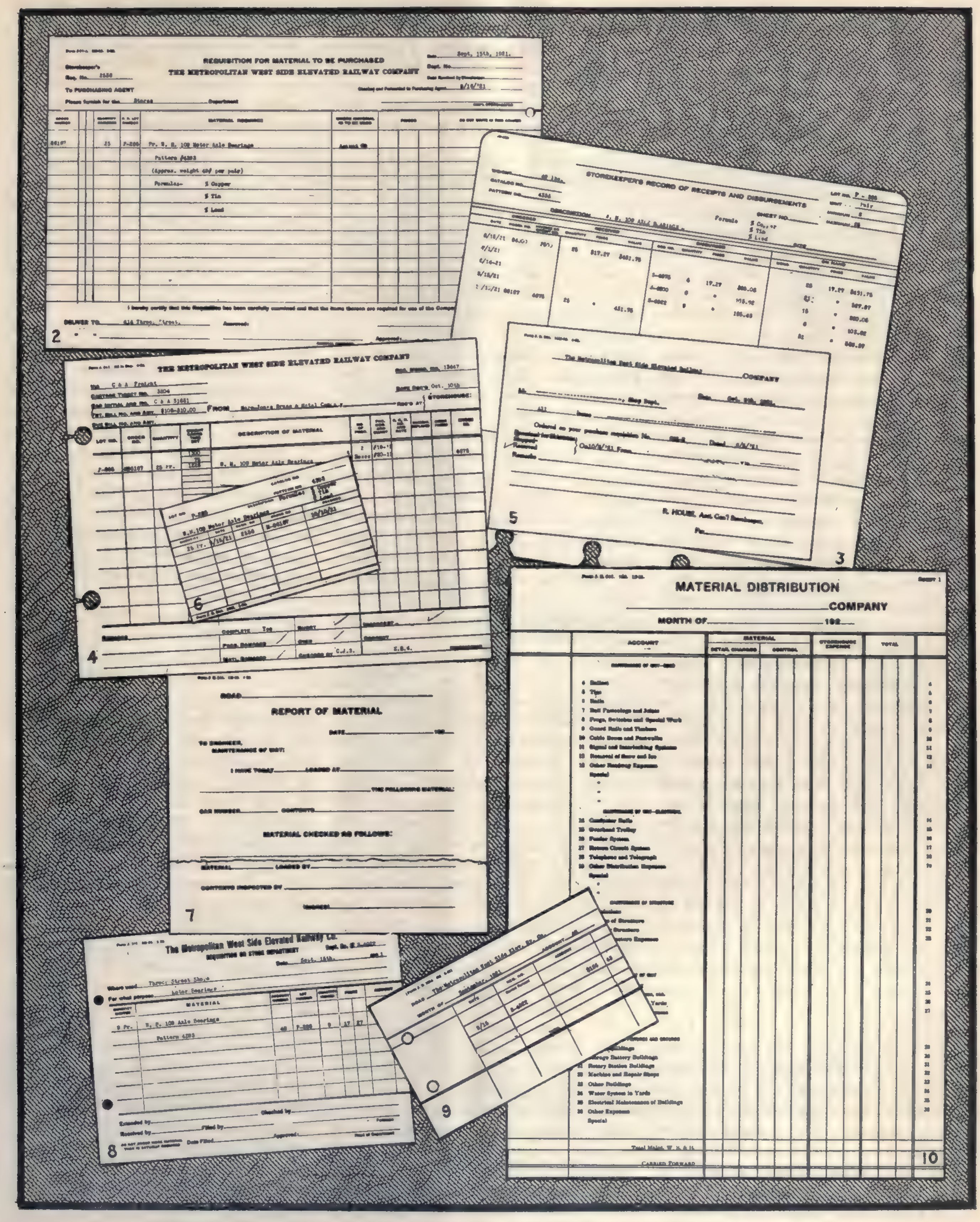


Fig. 1—Organization chart of the stores department, Chicago Elevated Railroads

With the system of storekeeping used each of the many thousands of items is given, for record purposes, what is called a railroad lot number. This corresponds to what manufacturers would call a catalog number. Each item of material is assigned to a certain class. The classifications of materials are shown on form JB-206-A, included in the accompanying illustrations. Each class has its own series of railroad lot numbers. For example, Class 125 is assigned R.R. Lot Nos. 1 to, say, 25. Class 126 would have R.R. Lot No. 26 to some other figure, and so on, depending upon the number of items in each class. Classes 134 to 158 inclusive, most of which include a great many small items, are each assigned lot numbers beginning with one (1), excepting we prefix the number with a letter. Letter "A" would designate Class 134, "B" Class 135, "C" Class 136, and so on. In other words, our lot number A1 would classify the material as being in Class 134, Lot No. 1. It will be seen, therefore, in Classes 125 to 133 the lot number itself designates the class of the material. On the remaining classes the letter prefix classifies the material. It is necessary on Classes 134 to 158 to begin with No. 1, otherwise the railroad lot numbers would run into four and five figures and it would be difficult to maintain a properly divided series of numbers.

The larger items of material are received and unloaded and stored in our storage yards, which are convenient to steam railroad connections. All other items are in the storehouse or storehouse yard, which in each case is adjacent to the repair shop of the individual road.

In the storeroom all materials belonging to a certain class are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REQUISITION FOR MATERIAL TO BE PURCHASED
THE METROPOLITAN WEST SIDE ELEVATED RAILWAY COMPANY
To PURCHASING AGENT
Pr. S. S. 109 Motor Axle Bearings
(Approx. weight 40# per pair)
Formulas- % Copper
% Tin
% Lead
DELIVER TO 414 Throop Street.

STOREKEEPER'S RECORD OF RECEIPTS AND DISBURSEMENTS

THE METROPOLITAN WEST SIDE ELEVATED RAILWAY COMPANY
FROM
DESCRIPTION OF MATERIAL
S. S. 109 Motor Axle Bearings

COMPANY
Ordered on your purchase requisition No.
R. HOUSE, Asst. Gen'l Storekeeper.

ROAD
REPORT OF MATERIAL
DATE
TO ENGINEER, MAINTENANCE OF WAY:
I HAVE TODAY LOADED AT
THE FOLLOWING MATERIAL:
CAR NUMBER CONTENTS
MATERIAL CHECKED AS FOLLOWS:
MATERIAL LOADED BY
CONTENTS INSPECTED BY

The Metropolitan West Side Elevated Railway Co.
REQUISITION ON STORE DEPARTMENT
Where used Throop Street Shops
For what purpose Motor Bearings
MATERIAL
S. S. 109 Axle Bearings
Pattern 4293
Checked by
Extended by
Received by
Filed by
Approved
Date Filed

ROAD The Metropolitan West Side Elev. Ry. Co.
MONTH OF September, 1921

MATERIAL DISTRIBUTION
COMPANY
MONTH OF 192
ACCOUNT
MATERIAL
STOREHOUSE EXPENSE
TOTAL
CARRIED FORWARD

Some of the forms used by purchasing and stores department, Chicago elevated railroads

Form J-31-A (Fig. 2) Form used for requisitioning material to be purchased.

Form JB-380 (Fig. 3) Ledger sheet used by storekeeper for record of receipts and disbursements from stores.

Form J-341 (Fig. 4) Memo made out by storekeeper upon receipt of new materials.

Form JB-384 (Fig. 5) Form used by stores department for notifying other departments of receipt of material ordered by them.

Form JB-358 (Fig. 6) Form kept in storekeeper's file for making record of each order placed for particular material.

Form JB-111 (Fig. 7) Receiving form used in place of J-341 when material is received in carload lots at storage yards.

Form J-207 (Fig. 8) Form used for requisitioning materials from stores department.

Form JB-138-A (Fig. 9) Summary of distribution made monthly for notifying department heads of material charged to each account.

Form JB-241 (Fig. 10) Monthly distribution form for giving department heads summary of totals of individual account summaries on Form JB-138-A.

stored in the same series of shelving, each compartment of this shelving being carded or tagged, showing the lot number and a description of the material, the compartments being numbered consecutively as far as it is possible to do so.

To follow the system through, it will be necessary to make use of various printed forms. To do this I will take an item of material and follow through the routine from the time the storekeeper orders this material to the receipt, storage and accounting of it in the stores department, then disburse some of it from the storeroom and follow through the accounting until the material is charged to some operating or other account and credited to the storekeeper's account. All materials received are charged to the storekeeper's account and are held there until disbursed for use to some other account.

As an example, let us take the item of W.H. 109 motor axle bearing, pattern 4393. First the storekeeper's order, Form J-31, is made up by the storekeeper in triplicate, all copies being forwarded to the general storekeeper's office, where a storekeeper's requisition number is assigned and quantities are checked against past consumption as shown on the ledger sheet, Form JB-380. If correct, the order is approved by the general storekeeper. The original copy is forwarded to the purchasing department, the duplicate is retained by the general storekeeper and the triplicate is returned to the storekeeper. This form is also used by operating departments in ordering special materials. They make an extra copy for their own files and assign their own department number for record. After the storekeeper's requisition (Form J-31) has gone through the routine, the purchasing department's purchasing order (Form 31) is placed and a copy of this purchasing order is forwarded to the general storekeeper and to the storekeeper of the individual road concerned. These copies of orders are filed in the store department alphabetically until completion of the order, when they are filed numerically in binders for future reference. The storekeepers record on their copies of Form J-31 the purchase order number.

Form JB-358 is a card kept in the storekeeper's file for making a record each time an order is placed for this particular material. This card also serves as a guide to him as to approximately how fast this particular item of material is used and also the approximate quantities to order.

RECEIPT OF MATERIALS IS FOLLOWED CLOSELY

After shipment, receiving memo Form J-341 (numbered in duplicate) is checked. This form is made out by the storekeeper, the original copy being sent to the general storekeeper's office, while the duplicate is retained by the storekeeper and filed numerically. The storekeeper also makes a record on his copy of the "purchase order" and the "receiving memo number."

All invoices from vendors are sent direct to the general storekeeper's office in duplicate. The original receiving memo is filed alphabetically in the general storekeeper's office until the receipt of the invoice, at which time the invoice is checked for quantities and description with the receiving memo, and if correct, this is so certified on the face of the invoice as shown and the original invoice is then forwarded to the purchasing department for price checking, approval for payment and forwarding to the auditor as authority to charge the storekeeper's account and vouchering for payment. The duplicate copy is retained in the general storekeeper's office for entry on the stock ledger (Form JB-380) and is then filed numerically. The receiving memo number and date are also recorded on the general storekeeper's copy of the purchase order and then both purchase order and receiving memo are filed numerically.

The form for "receipt of material" (Form JB-384) is used only where special materials are ordered by other departments. It is used also as general information to those departments to indicate when this material is promised for shipment, shipped or received.

The form for "report of material" (Form JB-111) is used in place of the receiving memo (Form J-341) when material is received in carload lots at the storage yards. All material received in the storage yards is unloaded by the maintenance of way department. This form is also used when material is loaded in the storage yard for outshipment.

The ledger sheet (Form JB-380) is kept in the general storekeeper's office. It is filed numerically in binders and with the lot number also acting as the ledger page number. On this sheet is recorded the general description of the material, weight, manufacturer's catalog number, if any, our pattern number, the unit, the minimum stock and the maximum stock. There is also recorded on this sheet information as to when the material was ordered, received, disbursed and the quantity of stock on hand. This process is all taken care of by a bookkeeping machine.

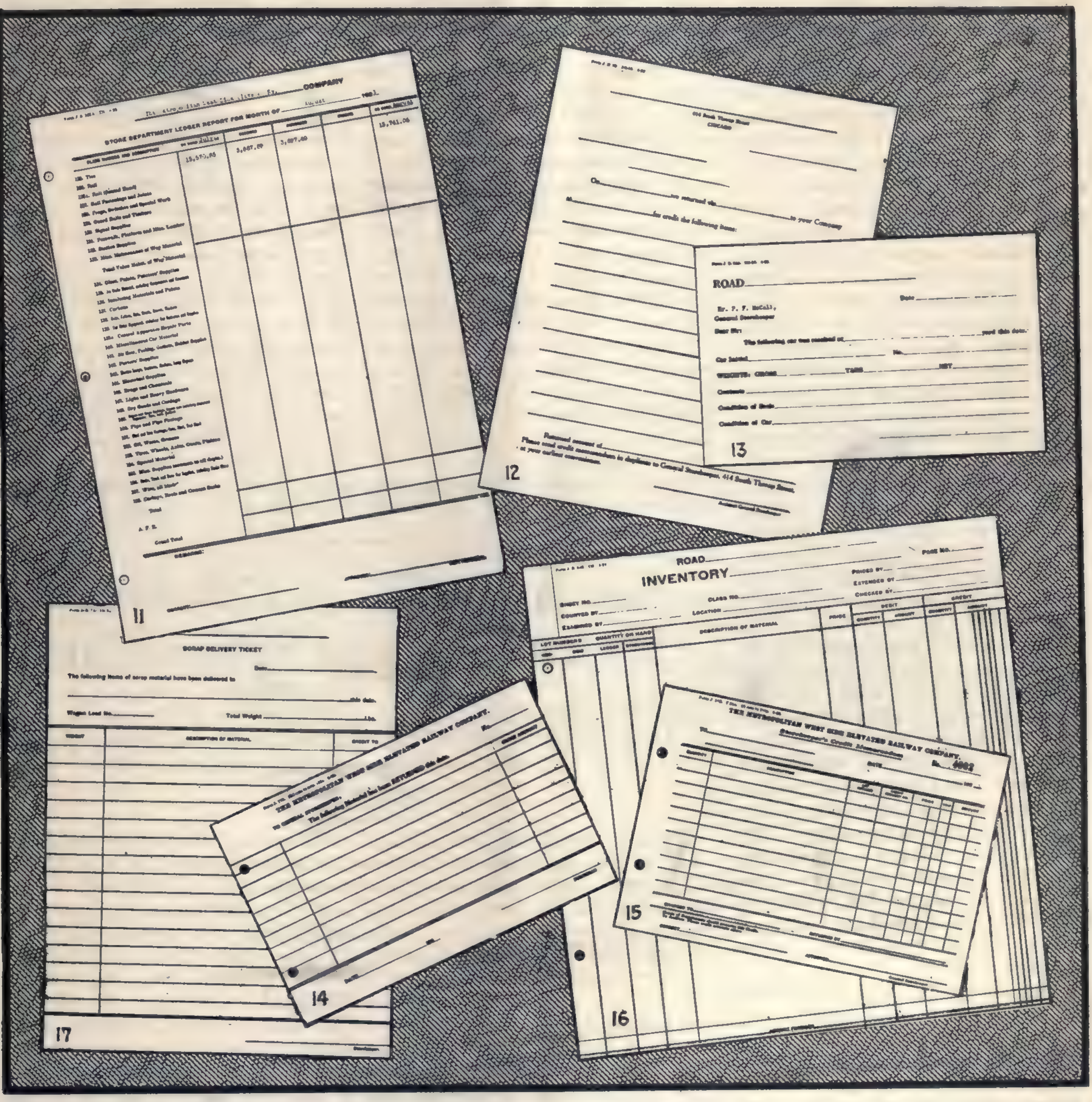
We have now been through the system of ordering material for stock and accounting for it until it is charged to the storekeeper's account. We will now as an example disburse nine pair of W.H.109 axle bearings and follow through the system until the storekeeper's account is again credited with the value of material disbursed.

The form of "requisition on store department" (Form J-207) is used by other departments for drawing material from the store department. The form is filled out in triplicate, the third copy being retained by the department requiring the material, the department also assigning its own department letter and number. A different letter is used by each of the departments, to designate whether it is shop, road or electrical department. The original and duplicate requisitions are presented to the storekeeper, who fills the order and inserts the lot number as shown on the bin from which the material is drawn. Both copies are then sent to the general storekeeper's office, where they are entered on stock ledger sheet (Form J-380) under the heading "disbursed." They are then priced, extended, checked and entered on the form for summary distribution (Form JB-138). The original is then filed numerically, the duplicate (also priced) being attached to a duplicate of Form JB-138. This duplicate copy of JB-138 and duplicate copies of requisition attached are forwarded monthly to the department head controlling the account, which gives him in detail all materials charged to any one of his individual accounts during the month.

The summary of distribution (Form JB-138) is made in duplicate in the general storekeeper's office, a set being made up for each account showing the totals of each requisition charged to that account during the month. The original copy is filed numerically according to account number in the general storekeeper's office. It will be seen from this form that it is possible to locate by number all requisitions chargeable to any individual account during any month.

The form for monthly distribution (Form JB-241) consists of five sheets showing the various accounts. This is made up in the general storekeeper's office and is a complete summary of the totals as shown on Form JB-138 for each account. The original is forwarded to the auditor, who credits the total amounts shown to the storekeeper's account, charging the various operating accounts plus a percentage to cover storehouse expense.

The monthly "store department ledger report" (Form JB-206A) is made up in the general storekeeper's office and is a monthly recapitulation of the ledger class control sheets. For the ledger class control sheets a copy of Form JB-380 is used, on which are recorded daily in money value only the debits and credits for the class of material. This information then at the end of the month is transferred to Form JB-206A. This report is valuable in that it analyzes the amount of funds tied up in each class of material and also shows the monthly turn-over in the various classes.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COMPANY
STORE DEPARTMENT LEDGER REPORT FOR MONTH OF

ROAD

INVENTORY

SCRAP DELIVERY TICKET

THE METROPOLITAN WEST SIDE ELEVATED RAILWAY COMPANY

Form JB-206-A (Fig. 11) Monthly store department ledger report.

Form JB-90 (Fig. 12) Form used in returning materials to manufacturer when rejected for any reason.

Form JB-348 (Fig. 13) Yardman's notice to general storekeeper of receipt of carload of material.

Form J-179 (Fig. 14) Form used for returning materials to storehouse.

Form J-180 (Fig. 15) Storekeeper's receipt for materials returned on Form J-179

Form JB-342 (Fig. 16) Sheet used in making check inventory against perpetual inventory.

Form JB-73 (Fig. 17) Notice of sale of scrap material sent to stores department by purchasing department.

This report also must agree with the auditor's report of total debits and credits to storekeeper's account.

As a matter of general information, there is also made up in the purchasing department a report sheet showing the various classes of materials and the money value of each of the classes on the first of the month. This shows a monthly comparison all on one sheet; that is, a report covering a whole year would have twelve columns and a comparison can be made month against month on any class.

Notice of return goods (Form JB-90) is made out in the general storekeeper's office in triplicate to cover material returned to vendors for any reason. It serves both as a shipping notice and as a request for credit. A copy of this notice is also forwarded to the purchasing department for its information. This return goods notice is numbered and recorded with credit memo when received on the receiving memo (Form J-341).

Notice of receipt of car (Form JB-348) is forwarded by the yard man to the general storekeeper and a copy is sent to the maintenance of way department as a notice to unload.

Form J-179 is used when any materials are returned by departments to the storehouse, either new or scrap material. This form is made in triplicate by the storekeeper, one copy to the general storekeeper, one copy to the department returning the material and one copy is retained by the storekeeper. This is notice to the general storekeeper that the storekeeper has received the material which should be credited to some other department account and charged to the storekeeper's account.

Form J-180 is made in triplicate by the general storekeeper on receipt of Form J-179. This form gives a complete record of material taken into the storekeeper's account and a copy of the form is sent to the auditor as authority to credit one account and charge the storekeeper's account, one copy being retained and the other copy being forwarded as a credit memorandum to the department whose account is credited.

The stock ledger provides a perpetual inventory record, but test inventories are taken, a few items at a time, continuously, to check actual material balances in the storehouse against stock ledger balances. A check inventory sheet (Form JB-342) is used for this.

The purchasing department, in placing orders, shows the railroad lot number for each item and requests the vendors when billing to show the lot number of each item on their invoice. It is then an easy matter, when the ledger clerk receives the invoice, to turn over to the page number in the ledger, which is also the lot number, and make the necessary entries.

All scrap materials are turned into the store department for credit to the proper account when sold. All sales of scrap are made by the purchasing department, the sale being given a so-called "scrap sale number." The general storekeeper receives from the purchasing department a notice of the sale of scrap to a dealer. The material is delivered to the dealer in accordance with the terms under which the sale was made.

The storekeeper, with the traveling storekeeper, weighs all scrap as it is delivered to the buyer. On delivery of scrap a receipt is obtained. Form JB-73 is then filled out and sent to the purchasing department as a record of material delivered on the sale and proper accounts credited. The sale of scrap is then formally closed in the purchasing department by the issuing of a scrap sale, giving a complete record of all materials sold under that sale number, and copy is forwarded to officers interested.

On our roads it is one of the duties of the traveling storekeeper to keep in actual touch at all times with the stocks in the various storehouses and yards and with work being done by other departments. If one road is overstocked on a certain item of material or if it has in stock materials which might not move promptly, and one of the other roads might at the same time need some of this same material, the material is transferred from one stock to another. In that way the combined investment in stock of the four roads is kept down.

Automatic Door Control on Latest Chicago Safety Cars

Forty-five New Cars Under Construction Will Be Double-Truck, Double-Door, Two-Motor, Fifty-Seat, One-Man Type—The Final Design of Automatic Exit-Door Control Is Detailed

AS A RESULT of a careful study of the operation of car No. 3092—one-man, double-truck, four-motor, double-door forty-six-seat—which has been in service for nine months and which was described in these columns in the issue of Jan. 14, 1922, the Chicago Surface Lines now has under construction forty-five similar units. This work is being done under the direction of H. H. Adams, superintendent of shops and equipment. A general view of the first of these cars to be completed is shown herewith.

Practically all of the construction features described for the earlier sample car, No. 3092, have been retained, but the new cars have been made one window longer. In developing the car structure and in the selection of materials, constant consideration was given to the reduction in weight. At the same time however, low maintenance and depreciation are assured by a consistent provision for rigidity and ruggedness. In carrying out this policy, the side girder sheets are made of No. 12 gage steel. The body floor is of double thickness and the bumpers and platform knees are of sufficiently heavy members to assure an ample factor of safety in meeting the requirements of congested city service.

The general dimensions of the new cars are as follows:

Length over bumpers..........	39 ft. 7⅛ in.
Length over corner posts......	26 ft. 1⅛ in.
Width over side girders.......	8 ft. 4⅝ in.
Seating capacity..............	50
Width of aisle................	28⅞ in.
Entrance and exit passageway widths	25⅛ in.
Height from rail over trolley boards	11 ft. 1⅛ in.
Height from rail to top of floor	33 in.
Height from bottom of side girder over top of side post........	7 ft. 1¼ in.
Side post centers..............	29⅛ in.
Truck centers	17 ft. 0 in.
Wheelbase of trucks..........	4 ft. 6 in.
Estimated weight, complete....	30,000 lb.

The general plan is exactly the same as that shown in Fig. 15 of W. T. Thorn's article in this issue, page 503; except that the length is increased by one window, or 29½ in.

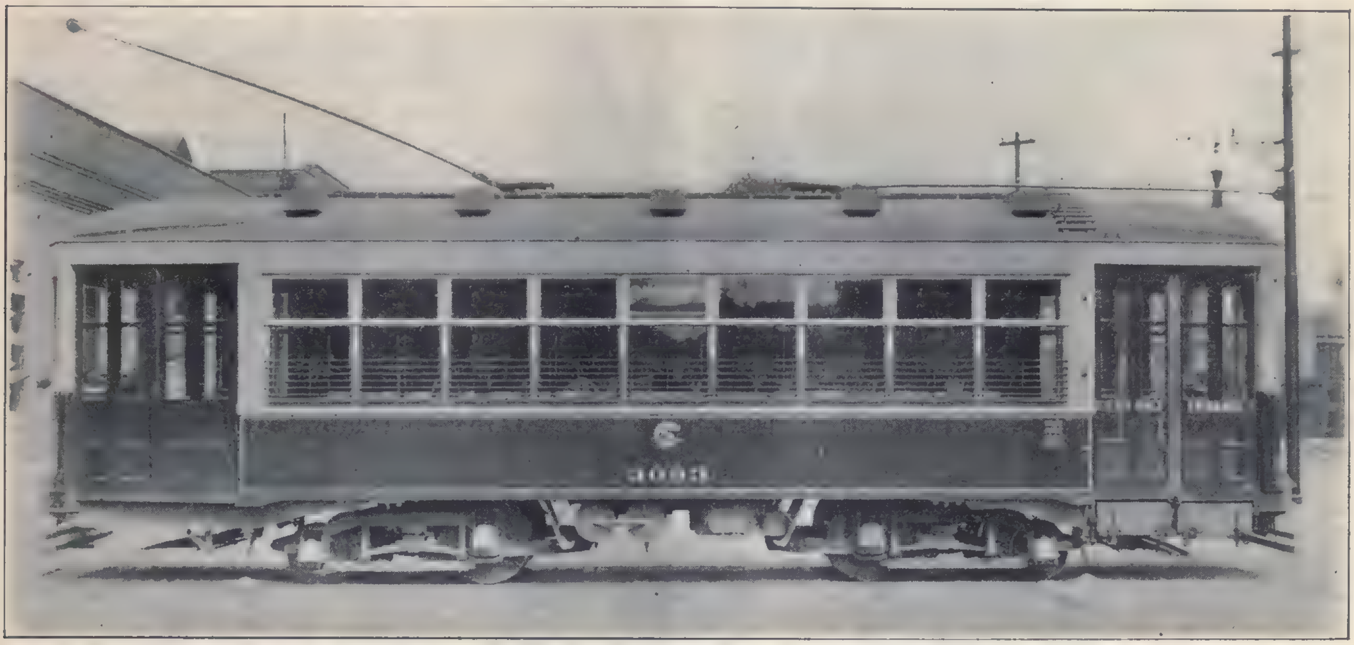
The cars will be equipped with two G.E. 275, 60-hp. motors with K-68 control, and Brill 39-E maximum traction trucks with 28-in. diameter driver wheels and 21-in. diameter pilot wheels. The selection of this type of equipment was the result of careful consideration of the advantages to be derived in reduced weight and maintenance from the use of two comparatively low speed, rugged motors, as compared with the smaller high-speed four-motor equipments usually applied to cars of this type and used on the sample car No. 3092. An interesting development is the use of aluminum for the controller frame and top, which results in a weight reduction of 120 lb. per car.

Full safety devices are being installed. The cars are also being equipped with the automatic exit door, which has been in successful passenger service on sample car 3092 since March, 1922. The primary purpose of this device is automatically to prevent boarding passengers from entering through the independent exit, which is provided for the free movement of those desiring to alight, thus expediting passenger movement and the collection of fares. The doors are selective in their operation; that is, the entrance and exit doors may be individually or simultaneously opened or closed as required, but with no additional attention on the part of the operator as compared to that required in the operation of the usual single door safety cars. Careful study under the various conditions encountered has demonstrated this door arrangement to be an entirely practical device for expediting passenger interchange without imposing additional duties on the car operator.

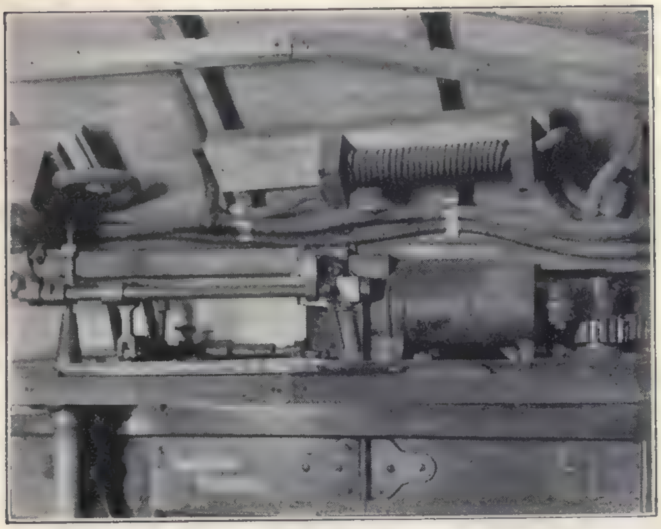
The entrance doors are operated by a two pipe engine connected with the brake valve in the customary manner. The exit doors are opened through the medium of a treadle which is placed in the exit passage on the platform and is of such liberal dimensions that a passenger stepping down into the exit passage from the car floor will necessarily be standing on the treadle. When the brake valve handle is placed in the "doors open" position to open the entrance doors, the exit door will also open simultaneously if a passenger is standing on the treadle, or will open when a passenger steps on the treadle, as long as the valve handle remains in "doors open" position. The brake valves used are of the latest type developed by the Safety Car Devices Company, in which "handle off" position is to the left of the "brake application" position. In addition, by a slight modification in the porting of the valve, the old lap "handle off" position is utilized as an "exit door open" position.

In this position of the handle, the entrance door does not open, but the exit door will open immediately if a passenger is standing on the treadle, or will open when a passenger steps on the treadle. The exit door quickly closes and the step folds up with no supervision from the operator, as soon as the passenger steps off to the street, unless a succeeding passenger has in the meantime stepped on the treadle. Should this latter have occurred, the door remains continuously open with no "flapping" between passengers. It will be readily appreciated that the quick closing of the exit door after the last passenger has left the car results in directing all entering passengers through the entrance passage. This expedites orderly loading and the collection of fares. Under a condition where a comparatively few people are leaving the car and a larger number are waiting to board, this arrangement is of particular advantage in facilitating fare collection. If an alighting passenger is standing on the treadle when the brake valve handle is moved to "doors open" position, the two doors open simultaneously. If he is not standing on the treadle, only the entrance door opens when the brake valve handle is moved to "doors open" position, the exit door remaining closed. The latter, however, opens quickly to allow him to alight, as soon as he has stepped on the treadle. Should a belated passenger desire to leave the car, the exit door will open instantly from the treadle, as long as the brake valve handle remains either in "doors open" or in "exit open" position.

The entrance door remains open



Latest Chicago one-man safety car seats fifty and is equipped with two 60-hp motors on maximum-traction trucks as long as the brake valve handle is allowed to remain in the "doors open" position. When the brake valve handle is returned to "service application doors closed," the entrance door closes and also the exit mechanism becomes inoperative, preventing the exit door from being opened by a passenger stepping on the treadle.



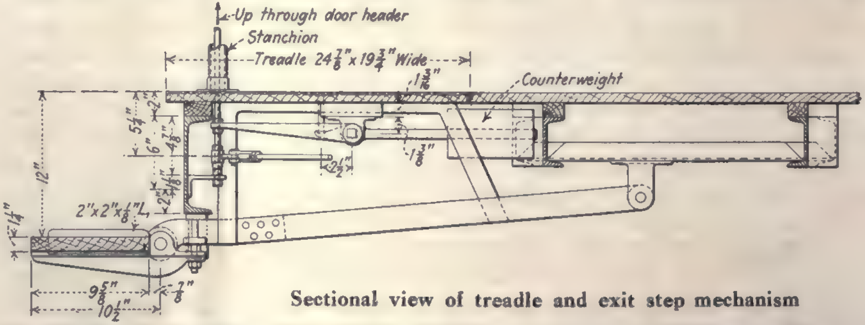
Arrangement of automatic exit door apparatus above header

If the exit door has been held open by a passenger standing on the treadle who does not desire to leave the car the movement of the brake valve handle to "doors closed" position results in the simultaneous closing of both the entrance and exit doors, even though the passenger continues standing on the treadle. Thus, although the mechanism remains in position to open instantly to enable a belated passenger to leave the car, as long as the operator's brake valve handle remains in "doors open" position, all doors are effectively locked as soon as the brake valve handle is returned to "doors closed" position.

The air for operating the exit engine is taken directly from the emergency line, so that if the brake system is thrown into "emergency" all doors on the car become balanced, enabling them to be pushed open by passengers. This includes the automatic exit doors as well as the entrance doors.

The operations described are obtained through the medium of a comparatively simple device. The engines are small, compact units, which were designed by the National Pneumatic Company, to meet the requirements imposed. They are mounted over the doors on the header. The exit door engine is of the one-pipe type, provided with an integrally mounted valve which is operated to open the door by the depression of a pin in the face of the valve, and which closes the door by the release of this pin. The valve pin is actuated from the exit treadle by means of a light rod extending up through the stanchion which separates the entrance and exit passages. The lower end of this rod is connected to a lever actuated from the floor treadle, so as to magnify the motion resulting from a depression of the treadle when it is stepped on by a passenger. The maximum treadle depression required does not exceed $\frac{3}{16}$ to $\frac{1}{4}$ in. In order to operate successfully under a comparatively light impulse, such as would be transmitted by a small child, the treadle itself is supported on arms which extend below the platform floor and beyond the edge of the treadle opening. On the front end of these arms, the exit step brackets are located, so that the step and treadle are connected together in such a way that the mechanism remains in the depressed position as long as a passenger is on either the treadle or the exit step. The general construction of this mechanism is illustrated below.

The upper end of the rod extending through the vertical stanchion mentioned is connected through a small rocker arm to a countershaft above the door header, which upon being rotated slightly, transmits the motion of the treadle to the exit engine valve. In order to prevent the exit door from opening until after the brake valve handle has been moved to "exit open" or "doors open" position, a small air cylinder is provided which prevents the exit engine valve from functioning until after the brake valve handle has been moved to the proper position by the operator and the treadle has been depressed by a passenger. No valve mechanism is used under the treadle.



Sectional view of treadle and exit step mechanism

It is apparent that the design is essentially mechanical in its operation and that the construction used eliminates the possibility of failure due to the accumulation of ice, mud or snow. In the initial installation of the device on car No. 3092, it was operated for long periods through exceedingly bad weather, and has amply demonstrated its reliability even under very adverse conditions. The small motion of all movable parts results in little wear.

An auxiliary control is provided for use in terminal loading, where it may be desirable to allow boarding passengers to enter through both doors. This is connected mechanically with the exit engine valve and enables the operator to open the exit door whether or not a passenger is on the treadle. When the door is opened in this manner, it remains open until the brakes are released. The closing operation is effected by the simple release of the brakes without any further attention to the auxiliary control handle, which resumes its normal position automatically. This feature is of value when changing ends at a terminal. Under this condition, the exit door may be opened as described, and allowed to remain open for passengers to enter while the operator is changing handles and taking his position at the opposite end of the car. In inclement weather, this is a particularly convenient feature. Release of the brakes from either end of the car results in closing the exit door, even though it were opened from the opposite end. The auxiliary control handle is interlocked so that the door cannot be opened by this means except upon applying full brake pressure.

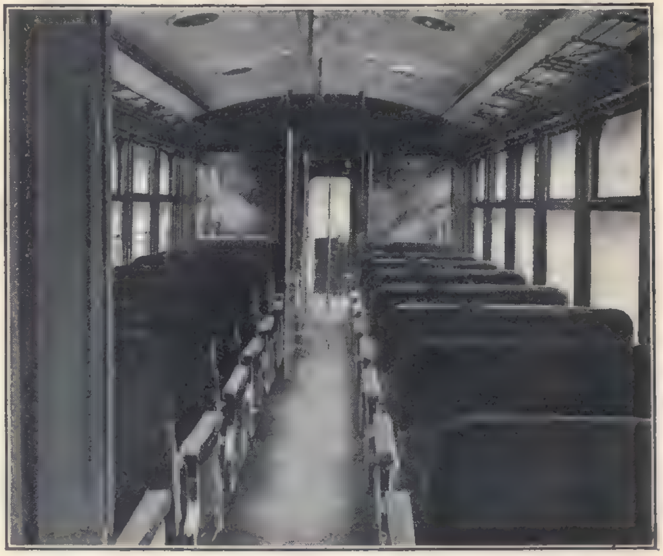
High-Speed Light-Weight Interurban Cars

Western Ohio Railway's New Equipment, Weighing Only 32,462 Lb., Enables This High-Speed Interurban Railway to Maintain 45 M.p.h. Schedule at Considerably Low Operating Cost

A FEW weeks ago the Western Ohio Railway placed in operation ten 45-ft. light-weight interurban cars developed by the G. C. Kuhlman Car Company, Cleveland, and mounted on Brill light-weight truck No. 77-E-1, which have most satisfactorily met the highest expectations of the operating company. This high-speed interurban line operates from Findlay through Lima to Piqua, in the western part of Ohio, a 113-mile line on which a schedule speed of 45 m.p.h. is maintained. In the short space of time these cars have been in service they have clearly demonstrated their ability as far as speed requirements are concerned. In fact, in some of the tests which have been made these cars easily made 50 m.p.h. Their weight of 32,462 lb. is less than half that of the high-speed cars displaced and the railway company's engineers report that power consumption is also reduced one-half. These are the first light-weight cars developed for the high-speed interurban service and the general acclaim which has met their introduction, both from the railway's officials and passengers, indicates more than anything else the success of this accomplishment of providing light-weight cars for high-speed lines.

As will be noted in the illustrations, this car conforms in general appearance to standard interurban equipment. It is of a combination passenger, smoking and baggage type, measures 34 ft. 2⅞ in. over the corner posts, 45 ft. 0⅞ in. over the bumpers and has a seating capacity of forty-eight passengers, six of whom are accommodated on folding seats in the baggage compartment. There is a 4-ft. sliding door on each side of the baggage compartment at the forward end. The rear platform, by way of which passenger entrance and exit is made, is inclosed on each side by a two-leaf folding door over stationary type steps.

The body construction is entirely of steel commercial shapes and pressings and includes sides of built-up steel girders extending from the side sill angles to the window sills, sheathed on the outside with No. 13 gage sheet steel side girder plates. Double corner posts are used and T-section side posts divide the double windows. These are placed 5 ft. 4 in. apart and extend from the side sill angle to the No. 16 pressed steel letter board. There is a T-section sub-post dividing each window in two parts which extends from the top compression member of the side girder at the window sill to the letter board. Pressed steel carlines, riveted to the letter board flange, support a ⅜-in. Haskelite veneer roof securely clamped at all edges to the letter panel flange and carlines by the special method of the car builder.



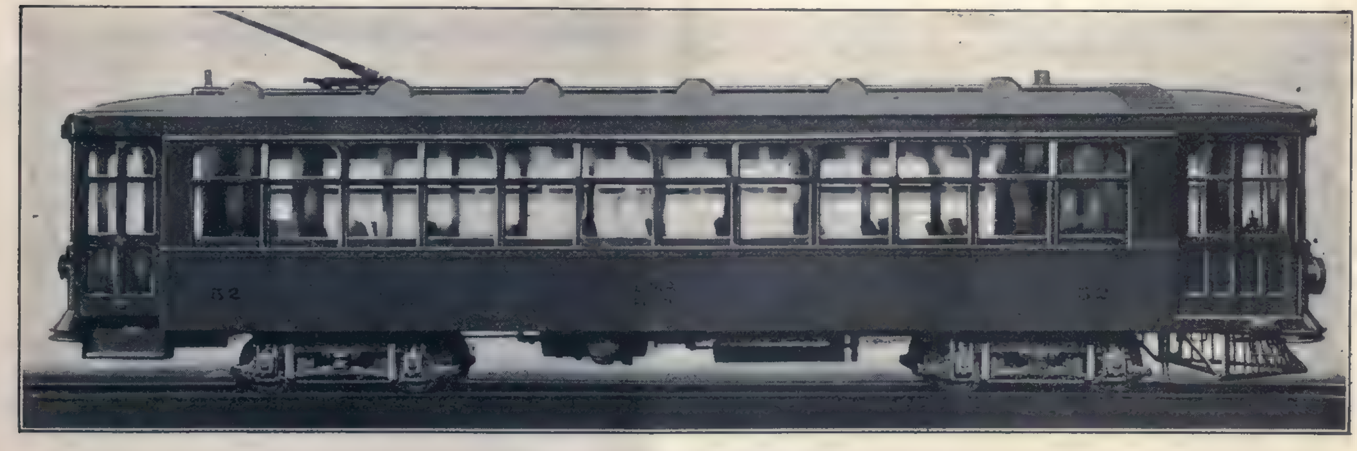
SEATS ARE ARRANGED FOR COMFORT DURING LONG TRIPS

The side window sash are of the double type, each upper sash spanning two lower sash. All lower sash, which are arranged to raise, have brass sash stiles which fit into the grooves of the Brill "Renitent" spring brass post casings. This type of post construction holds the window sash under compression, preventing sash rattle and providing a sash fit which is air, dust and water tight.

Inside the body at the forward end there is an open archway, while at the rear there is a closed bulkhead fitted with a swing type door. Between the compartments there is a partition made of cherry, having a swing

PRINCIPAL DIMENSIONS AND WEIGHTS

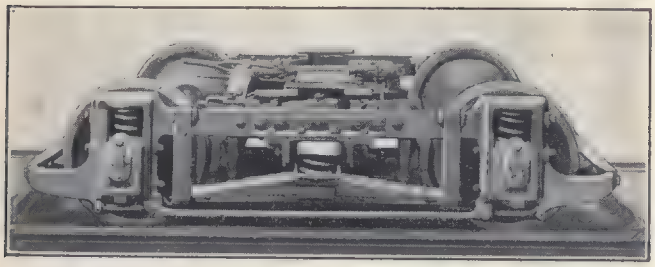
Length over corner posts	34 ft. 2⅞ in.
Length over platforms	43 ft. 9⅞ in.
Length over bumpers	45 ft. 0⅞ in.
Width over sides	8 ft. 6 in.
Extreme width	8 ft. 8½ in.
Height, rail to side sills	2 ft. 2½ in.
Height, rail over trolley boards	10 ft. 7⅞ in.
Height, rail to step	16½ in.
Height, step to platform	15½ in.
Weight of body, less electric and air equipment	14,382 lb.
Weight of electrical equipment on body	1,200 lb.
Weight of air equipment on body	1,500 lb.
Weight of motors	5,114 lb.
Weight of trucks, including gears	10,266 lb.
Total weight	32,462 lb.



EXTERIOR OF NEW INTERURBAN CAR

type door fitted with stationary sash, except that between the smoking and baggage compartments, which is paneled on each side of the door.

Below the windows on each side the construction is insulated for heat and cold by the installation of specially treated balsa wood, ¾ in. thick, covered with thin linoleum painted to conform to the interior finish. All window sill cappings and interior moldings as well as the Brill spring brass "Renitent" post casings are painted cherry. The ceiling, the underside of the three-ply veneer roof, is finished in white enamel as no interior headlinings are required.

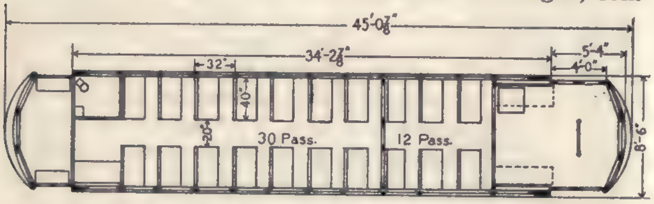


NEW DESIGN INTERURBAN TRUCK ON WESTERN OHIO CARS

As indicated on the accompanying diagram, a saloon is located in the rear right-hand corner of the passenger compartment. Provision is made in this saloon for the usual water cooler. All transverse seats are of the Brill non-reversible type for interurban service with pressed-steel aisle plates and aisle rests with wood caps. Those in the passenger compartment are upholstered in plain green plush, while those in the smoking compartment are upholstered in imitation leather. These seats provide the kind of passenger comfort so essential to long interurban service and which must necessarily be considered in any type equipment for this class service. The longitudinal seats in the baggage compartment are of the folding slat type.

The electrical equipment of these cars includes four G. E. No. 265 motors (35 hp.), with K-35 control for single-end operation, and G. E. straight airbrake equipment, with an emergency feature having a conductor's valve at the rear end, is also used.

Much attention was given to the question of trucks, taking into consideration the questions of weight, comfort and safety. The Brill No. 77-E-1 truck, which was adopted, has a 5-ft. 4-in. wheelbase, 26-in. diameter rolled steel wheels, 3½-in. tread and ⅞-in. flange. There are many features of this truck which adapt it to this particular class of service. It has solid-forged side frames, is comparatively light in weight and includes a number of patented features which have an important influence on the comfortable riding action of this type truck.



PLAN OF WESTERN OHIO RAILWAY'S NEW CARS

While the weight of 32,462 lb. for the car in complete running order is higher than other cars of the same proportions, the body is considered equally as light as the lightest car of its size yet developed, and the weight is attributed to the heavier equipment required in high-speed interurban service.

Representation Plan Highly Successful

FOR almost four years now the "representation plan" on the Kansas City (Mo.) Railways has been tested in the crucible of daily experience and has emerged as perfect in its record of accomplishment as anything of the kind could be expected to do. How well-nigh perfect the record has been is, perhaps, best attested by the statement that not one case coming up for settlement has ever got as far as the central committee and that 99 per cent of the cases are settled in the division committees. There have been very few appeals to the general mechanical and general transportation committees. In short, four years use of the plan has demonstrated conclusively that the objects sought to be accomplished have been accomplished, namely:

1. Insure to every employee exact justice in all matters of discipline or discharge.
2. Settle and adjust promptly all questions affecting wages and working conditions.
3. Provide for compulsory arbitration as a last resort.
4. Insure co-operation between employees and management in all matters affecting the operation of the company and the welfare of its employees.
5. Insure continuous, uninterrupted transportation service to the public.

The general plan as put into effect on April 1, 1919, has been revised by the employees and their committees twice since its adoption, changes being minor organization ones. The range of activities under this system comprises everything connected with the operation of the road. Committees form the machinery for considering every possible thing that is taken up. About half the time of the committees is taken up in adjusting grievances and settling disputes.

In the three years of the work of the plan, F. G. Buffe, general manager of the company, the author of the plan, has never had a single case appealed to him, despite the fact that there are more than 3,000 employees. This is all the more remarkable when it is considered all matters affecting the relations between the company and its employees, after following the various courses of appeal, rest for final settlement in the hands of the central committee, but that no employee is prevented from acting individually or taking up any matter with any official of the company or the receiver. In a pamphlet on the plan Mr. Buffe said:

> The Kansas City Representation Plan has now been in effect for four years and, with slight modifications made by the central committee, is substantially the same as the employees adopted in April, 1919. It provides for the representation of the employees of this company in its management and gives them complete committee representation to adjust any grievances that may arise affecting the individual case, working conditions or wages.
>
> One of the chief reasons for the continued success of the company has been the wonderful spirit of co-operation shown.

Another little booklet issued by the company contains an account of the various activities which are supported by and for the men. The building and loan association now has assets exceeding $300,000 and the monthly pay-roll deductions are more than $10,000. The brotherhood, as it is known, meets once a month. Of the 3,000 employees eligible for membership in it, more than 2,800 belong. Members are entitled to a most imposing list of benefits for monthly dues of $1.75 each. Mr. Buffe is quoted:

> I do not believe I am exaggerating when I say that the labor situation in Kansas City, as far as we are concerned, is no longer a problem. It has never been my pleasure to see a better satisfied or more contented bunch of employees, and you can't knock the Kansas City Railways to any one of them without having an argument then and there.

Riding on a Pass

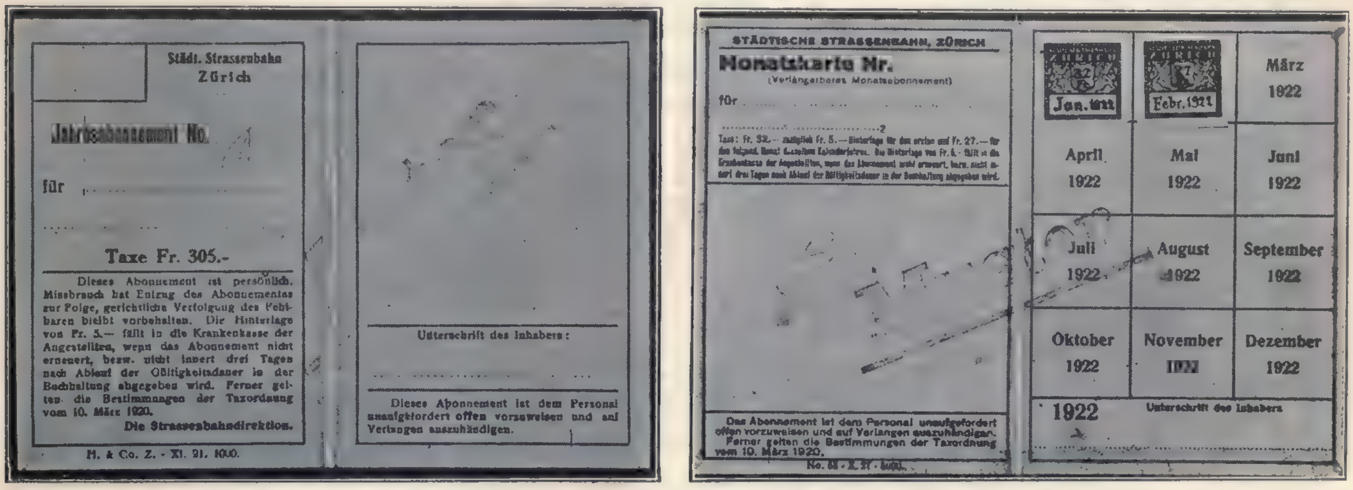
Studies Are Given of Long-Standing European and Recently Devised American Forms of Blanket Transportation with Comments as to Their Relative Advantages

BY WALTER JACKSON
Fares Consultant

WHEN the writer first suggested the weekly, unlimited-ride, transferable pass inaugurated on the Racine division of the Milwaukee Electric Railway & Light Company on Aug. 18, 1919, many electric railway operators held that this or any other form of non-recorded, intangible transportation was impracticable. As a matter of fact, there was nothing new in the idea of the pass itself but only in the manner of fixing its price, its period of validity, restrictions as to use and selling effort or advertising. Its practicability under American fare conditions has now been demonstrated not only at Racine (63,000 people), but also at Kenosha (44,000 people) since Jan. 24, 1921; Youngstown (146,000) since Oct. 3, 1921; Beaver Valley Traction Company (cross-country line serving 64,000 people) since Feb. 13, 1922; Fort Wayne (86,000 people) since Feb. 27, 1922; Terre Haute, Ind., and Meadville, Pa., since May 1, 1922; Fort Smith, Ark., May 29, 1922; also Gainesville, Ga.; Tacoma, Everett and Bellingham, Wash.; Houghton, Mich.; St. John, N. B.; Paducah, Ky., etc. In all some twenty cities are using the pass. The Chicago Elevated Railways also filed a new fare scale to include a $1.25 pass as of Sept. 18, and applications for the Pomona and Riverside systems of the Pacific Electric Railway, Astoria, Ore., and the Washington-Virginia Railway are in hand.

Again in August, 1920, the Mason City (20,000 people) & Clear Lake Railroad inaugurated a personal monthly ticket originated by R. Schaddelee, president of the company. Although the holder of the ticket does have to pay a tangible fare per ride, the ticket is in effect a pass which allows a lower rate per ride and therefore comes within the scope of this study. In November, 1921, the same plan became effective on the Clinton, Davenport & Muscatine Railway (16,000 people in Muscatine) with which Mr. Schaddelee is also connected. In both these cases the pass was introduced to give a lower rate to the steady rider while the casual patron's fare was raised from 7 to 10 cents cash straight. On Jan. 1, 1922, however, the Joliet (38,000 people) Electric Railway adopted this plan at a time when the straight cash fare was 10 cents, so that an increase in gross revenue would be attainable only through a heavy increase in riding.

Since both the weekly and monthly passes have attracted much attention and are likely to be adopted by many others, it seems appropriate now to discuss the types used on foreign city and rapid transit lines. It was personal study of these examples that led to the suggestion of a weekly unlimited-ride, transferable pass based upon the cost of more than twelve full fares a week.



Städt. Strassenbahn
Zürich

Jahresabonnement No.

für

Taxe Fr. 305.-

Dieses Abonnement ist persönlich. Missbrauch hat Entzug des Abonnementes zur Folge, gerichtliche Verfolgung des Fehlbaren bleibt vorbehalten. Die Hinterlage von Fr. 5.— fällt in die Krankenkasse der Angestellten, wenn das Abonnement nicht erneuert, bezw. nicht innert drei Tagen nach Ablauf der Gültigkeitsdauer in der Buchhaltung abgegeben wird. Ferner gelten die Bestimmungen der Taxordnung vom 10. März 1920.

Die Strassenbahndirektion.

H. & Co. Z. - XI. 21. 1000.

Unterschrift des Inhabers:

Dieses Abonnement ist dem Personal unaufgefordert offen vorzuweisen und auf Verlangen auszuhändigen.

STÄDTISCHE STRASSENBAHN, ZÜRICH
Monatskarte Nr.
(Verlängerbares Monatsabonnement)
für

Das Abonnement ist dem Personal unaufgefordert offen vorzuweisen und auf Verlangen auszuhändigen. Ferner gelten die Bestimmungen der Taxordnung vom 10. März 1920.

Jan. 1922	Febr. 1922	März 1922
April 1922	Mai 1922	Juni 1922
Juli 1922	August 1922	September 1922
Oktober 1922	November 1922	Dezember 1922

1922 Unterschrift des Inhabers

AT LEFT, YEARLY PASS OF THE ZURICH MUNICIPAL RAILWAY. THE RENEWABLE ZURICH MONTHLY PASS IS AT THE RIGHT

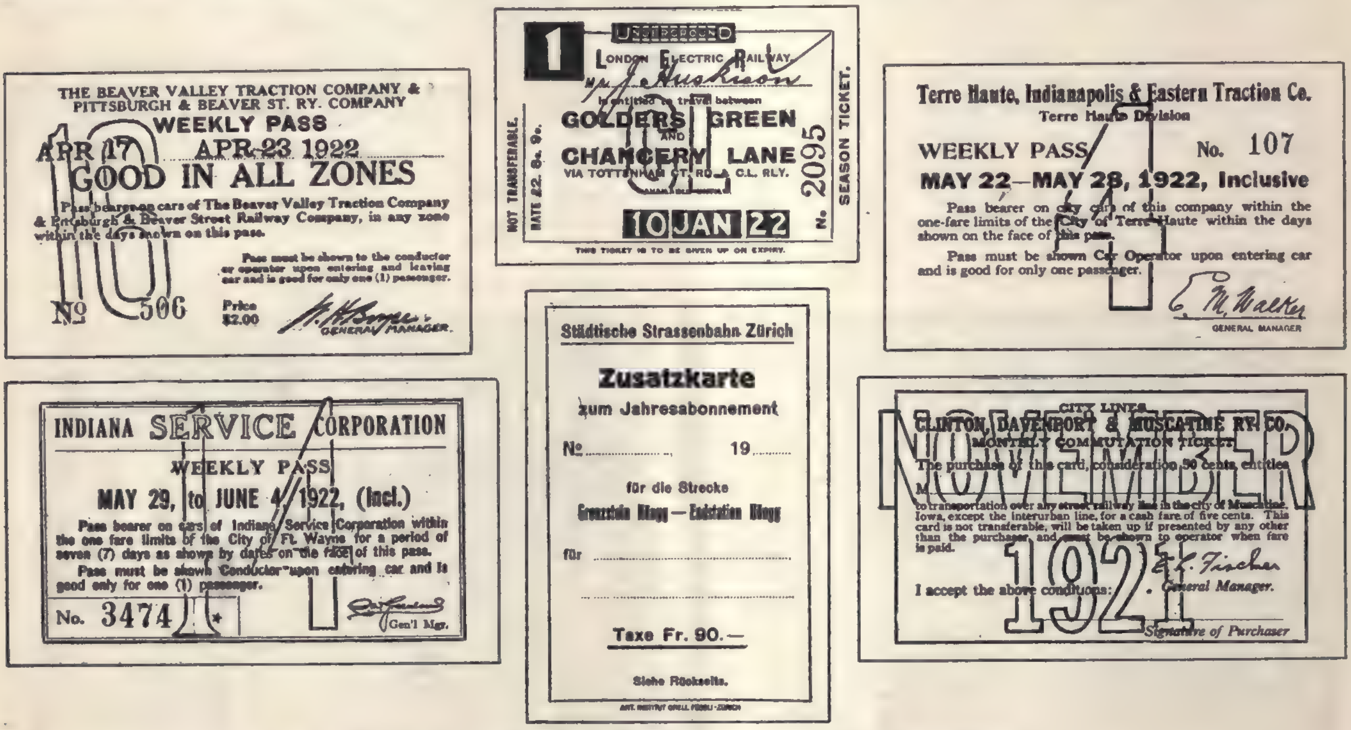
Zurich is an industrial city of 205,000 population with publicly owned street railways. Like most foreign lines the latter have a variety of fares that would stagger operators used to the charming, but not necessarily economic, simplicity of most American systems. The fare schedules inaugurated as of April 26, 1920, show:

Single-trip cash fares of 20, 30 and 40 rappen (or 4, 6 and 8 cents), according to distance.

Bound booklets containing eighteen tickets for 5 francs and good over the entire system, twenty-eight tickets for 5 francs good only for one zone or thirty-three tickets for 5 francs good only for rides before 7:45 a.m. These tickets must be detached by or in presence of the conductor, but as many people may ride simultaneously as there are tickets available.

The passes issued in Zurich cover periods from one year down to one month. Those sold to the general public are not transferable and must bear the buyer's photograph. Those purchased by the post office and the telephone and telegraph department are merely numbered and their use is limited to employees of these government bureaus. There are also special passes for children who are aided by the municipal welfare bureau and for students (school days only) in the local school of forestry. Still another variety is involved in the purchase of an extra-fare pass for those Zurich passholders who wish to ride on the Hongg suburban division. Finally, there is a package pass which is purchased by merchants for their messengers. This pass does not cover personal fare but does cover the right to transport packages that would otherwise have to be paid for by the piece.

All passes are made up in the form of a pair of stiffly-bound cloth covers. They are not transferable. Usually the regulations, name of user, cost, etc., are printed on the paper pasted inside these boards, but the passes issued to government employees also have outer identification as the covers are of a different color.



THE BEAVER VALLEY TRACTION COMPANY &
PITTSBURGH & BEAVER ST. RY. COMPANY
WEEKLY PASS
APR 17 APR 23 1922
GOOD IN ALL ZONES
Pass bearer on cars of The Beaver Valley Traction Company & Pittsburgh & Beaver Street Railway Company, in any zone within the days shown on this pass.
Pass must be shown to the conductor or operator upon entering and leaving car and is good for only one (1) passenger.
№ 506
Price $2.00
GENERAL MANAGER.

UNDERGROUND
1
LONDON ELECTRIC RAILWAY.
Mr. J. Huskison
is entitled to travel between
GOLDERS GREEN
AND
CHANCERY LANE
VIA TOTTENHAM CT. RD. & C.L. RLY.
NOT TRANSFERABLE.
RATE £2. 8s. 9d.
№ 2095
SEASON TICKET.
10 JAN 22
THIS TICKET IS TO BE GIVEN UP ON EXPIRY.

Terre Haute, Indianapolis & Eastern Traction Co.
Terre Haute Division
WEEKLY PASS No. 107
MAY 22—MAY 28, 1922, Inclusive
Pass bearer on city cars of this company within the one-fare limits of the City of Terre Haute within the days shown on the face of this pass.
Pass must be shown Car Operator upon entering car and is good for only one passenger.
E. M. Walker
GENERAL MANAGER

INDIANA SERVICE CORPORATION
WEEKLY PASS
MAY 29, to JUNE 4, 1922, (Incl.)
Pass bearer on cars of Indiana Service Corporation within the one fare limits of the City of Ft. Wayne for a period of seven (7) days as shown by dates on the face of this pass.
Pass must be shown Conductor upon entering car and is good only for one (1) passenger.
No. 3474
Gen'l Mgr.

Städtische Strassenbahn Zürich
Zusatzkarte
zum Jahresabonnement
№ .... 19 ....
für die Strecke
Grenzstein Hongg — Endstation Hongg
für ....
....
Taxe Fr. 90.—
Siehe Rückseite.
ART. INSTITUT ORELL FÜSSLI - ZÜRICH

CITY LINES
CLINTON, DAVENPORT & MUSCATINE RY. CO.
MONTHLY COMMUTATION TICKET
NOVEMBER
The purchase of this card, consideration 90 cents, entitles M.................. to transportation over any street railway line in the city of Muscatine, Iowa, except the interurban line, for a cash fare of five cents. This card is not transferable, will be taken up if presented by any other than the purchaser, and must be shown to operator when fare is paid.
1921
E. L. Fischer
General Manager.
I accept the above conditions: ....
Signature of Purchaser

GROUP OF TYPICAL EUROPEAN AND AMERICAN PASSES

Upper row, left to right: Beaver Valley Traction Company, London Underground Railways, Terre Haute City Lines. Lower row, left to right: Fort Wayne (Ind.) City Lines, Zurich (Switzerland) supplementary ticket for Hongg division, Muscatine (Iowa) City Lines

The passholder who rides on the Hongg division must also show a separate card. There is no registration on the car to show how often each class of passholder rides, but four rides a day and 360 days in the year are used in estimating the volume of pass traffic.

How does the Zurich management, after many years of experience, determine the cost of the passes used by the general public?

The annual pass is sold at 305 francs, which is equivalent to 83.5 rappen a day. As the maximum single-trip fare is 40 rappen, the cost of the pass is equal to 2.1 rides a day. For this, the holder probably averages four to five rides per working day, as Zurich is a compactly built city and the average business man and woman allow more time for the luncheon period than here.

The semi-annual pass is sold for 155 francs or 83.6 rappen a day, making the cost per trip almost the same as to the annual passholder. A monthly pass at 32 francs costs a bit more per day, viz., 1.03 francs or a little more than two and one-half times the price of a single-trip maximum-length ride at 40 rappen. But, of course, the passholder will average more than two rides a day. Those who start with a monthly pass may purchase (through stamps as shown) an extension at the rate of 27 francs per month within the same calendar year. If such a purchaser started in January, his total cost would be 309 francs or only 4 francs more than the one who could afford the entire year's outlay at once. Each passholder also deposits 5 francs, which is forfeited to the employee's benefit fund if the pass is not returned within three days after expiration.

During the year 1920, there were sold 491 annual, 3,244 semi-annual and 27,426 monthly adult, individual passes which were responsible for 6,342,480 out of a total of 48,618,232 passengers. About 50 per cent of all passengers paid full fare; about 20 per cent purchased the different varieties of 5-franc booklets, while the rest were on either personal or public passes.

In the fiscal year ended May 31, 1920, the Aberdeen (population 165,000) Corporation Tramways derived approximately 3.5 per cent of its passenger revenue from the sale of quarterly passes, locally termed "composition tickets." These are non-transferable cloth-covered boards similar to the type used at Zurich, but no photograph of the passholder is required. The pass is made out for any desired number of zones between specified points. The adult's rate is £1 for the first 2,100 ft. and 8d. for every additional 300 ft.; passes for children under fifteen years are half price.

To see how the adult fare shapes up against single-trip rides, the Mannofield route may be taken for comparison, as this is one on which the passes have been responsible for as much as 20 per cent of the riding. This route has an over-all fare of 2d. for its length of 2.06 miles. The average length of ride of a 2d. rider, however, may be taken at 1.75 miles. A regular rider over that distance would therefore have to pay for a stretch of 9,240 ft., which would cost him £1 for the first 2,100 ft. and 8d. more for each additional stretch of 300 ft. (300 ft. into 7,140 ft. or 23.1 × 8d.). This equals 424.8d. for say ninety days' riding, or 4.7d. a day. Two cash trips would cost 4d. anyway, so that for 0.7d. a day the passholder gets all the extra, off-peak rides he wants.

BLACKPOOL CALLS THEM "CONTRACT TICKETS"

The famous English bathing resort, Blackpool (population 58,000), sold during the fiscal year ended March 31, 1921, a total of 5,463 annual passes locally termed "contract tickets." The revenue from this source was £14,896, which was approximately 5 per cent of the total traffic receipts of £276,598. Contract tickets are so called from the fact that they are applied for on a formidable contract form which shows the prices for different stages and the reduction for juveniles under eighteen years of age. Up to July, 1919, an over-all pass cost only £3, or 720d. for anywhere up to 1,825 rides a year, assuming five rides a day—the general manager's estimate. The cost was doubled at that time, making the relation stand at 1,440d. for 1,825 rides. Even on the basis of four rides a day for 360 days in the year, there would be 1,440 rides, making the cost 1d. per ride, whereas the average distance for a penny in June, 1921, was only 0.9 mile. An over-all passholder would average a much longer trip than this; if not, he could buy a "one-section" pass at half price. So regarded from any angle, the cost of the Blackpool pass is far too low to be economic.

A feature common to both the Zurich and Blackpool contracts is that in the event of the passholder's death or other special causes, a rebate is made. At Blackpool, the matter is left to the discretion of the general manager; at Zurich the restitution amounts to 9 francs for each unused half of a calendar month following at least one month's illness or absence.

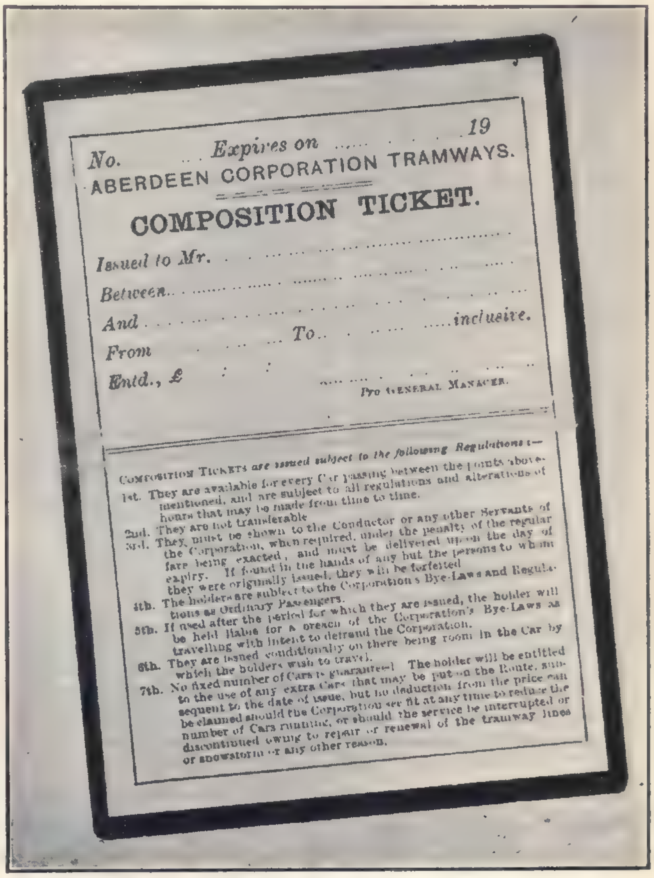
LONDON'S STATION-TO-STATION PASSES

In addition to its endless variety of graduated single-trip fares and special round-trip fares, the London Underground Electric Railways also issues passes called "season tickets" or "seasons" between any desired stations and good also for all intermediate stations. They are sold for annual, semi-annual, quarterly and monthly periods good only for the purchaser. Half-rate passes are obtainable also for children under fifteen years of age, for juveniles such as apprentices, clerks, etc., under eighteen years of age. Passes are issued at once from the season ticket office, or on twenty-four hours notice from any booking station. Season tickets must be returned within one day after expiration. There is no penalty for failure to do so, but the company may refuse to issue a new pass if the old one is not turned in. No allowance is made for the unused portion of monthly tickets. To encourage contracts for the longer period, the cost of a monthly ticket is 10 per cent higher per diem than a quarterly ticket.

The principle of fare fixing used in connection with London "seasons" is akin to that of the American steam railroad commutation book except that the "season" is good for an unlimited number of rides within the time limits. In general, a patron who lives too far out to go home for lunch averages a daily fare expense below that of two cash rides. In addition to this reduction based on his twelve compulsory rides a week, he gets all his evening and holiday riding for nothing. The natural consequence is that he is more likely to go out then than if he had to pay fare. In doing so, he will have one or more companions going the same way for whom fare must be paid unless they also are passholders.

On the other hand, a person living close enough to his work to average four rides a day may be assessed the cost of two and one-half to three cash rides. In this way, he gets his off-peak rides at a very low rate; and like his long-distance brother takes out his family or friends oftener than he would if he had no pass for himself.

The London season ticket is nothing more than a simply-worded card 3x2⅛ in., on which is stamped the date of expiration. Where it is not worth while to print the names of the stations, a rubber stamp serves the purpose. Thus: "Golders Green and Chancery Lane via Tottenham Court Road and Central London Ry." is printed, while "Strand and Knightsbridge via Leicester Square" is stamped. The pass bears the signature of the user.


No. Expires on 19

ABERDEEN CORPORATION TRAMWAYS.

COMPOSITION TICKET.

Issued to Mr.

Between

And inclusive.

From To

Entd., £

Pro GENERAL MANAGER.

COMPOSITION TICKETS are issued subject to the following Regulations:—

1st. They are available for every Car passing between the points above-mentioned, and are subject to all regulations and alterations of hours that may be made from time to time.

2nd. They are not transferable.

3rd. They must be shown to the Conductor or any other Servants of the Corporation, when required, under the penalty of the regular fare being exacted, and must be delivered up on the day of expiry. If found in the hands of any but the persons to whom they were originally issued, they will be forfeited.

4th. The holders are subject to the Corporation's Bye-Laws and Regulations as Ordinary Passengers.

5th. If used after the period for which they are issued, the holder will be held liable for a breach of the Corporation's Bye-Laws as travelling with intent to defraud the Corporation.

6th. They are issued conditionally on there being room in the Car by which the holders wish to travel.

7th. No fixed number of Cars is guaranteed. The holder will be entitled to the use of any extra Cars that may be put on the Route, subsequent to the date of issue, but no deduction from the price can be claimed should the Corporation see fit at any time to reduce the number of Cars running, or should the service be interrupted or discontinued owing to repair or renewal of the tramway lines or snowstorm or any other reason.

THIS PASS (COMPOSITION TICKET) USED AT ABERDEEN FOLDS AND HAS A STIFF CLOTH BACK

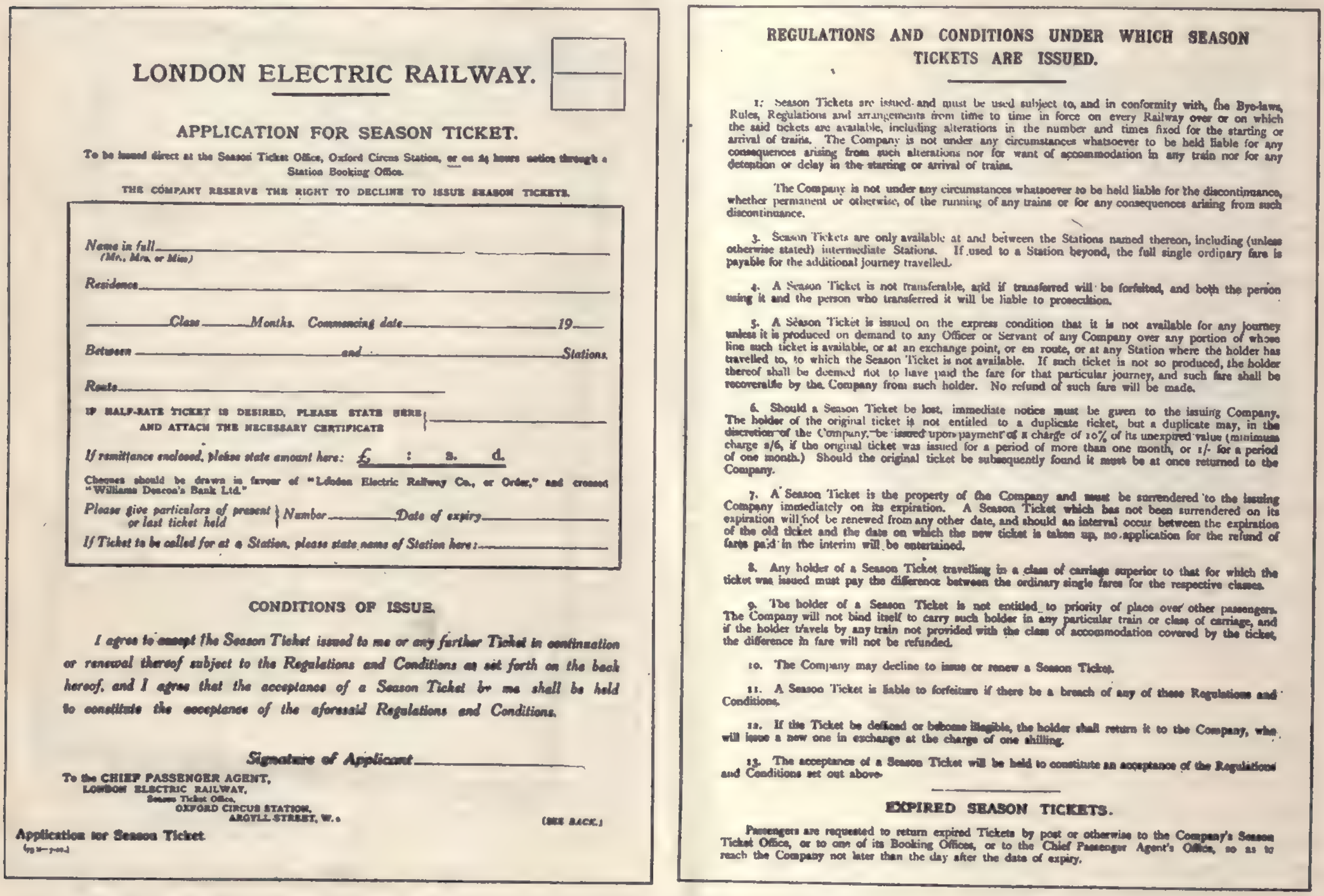
VIENNA USES PHOTO IDENTIFICATION

The Vienna Municipal Tramways probably has a greater variety of passes than any other street railway in the world—or did. The writer cannot guarantee what the present practice is for there have been numerous changes in fare since his visit in 1921. With a wildly fluctuating exchange, the management can hardly afford to make even a monthly agreement with a passenger.

One pass covering the period of Jan. 2-July 1, 1921, was sold for 2,300 kroner and was good only in fare area I, exclusive of any special-fare sections therein. A space was provided for the passholder's photograph. The opposite side carried the expression: "Netzkarte

No. ......" or "Pass No. ...... Section I" with lines for the name, address and signature of the purchaser. The wording at the bottom was to the effect that the pass is not transferable and that it would be taken up if found in the wrong hands. The pass is illustrated.

A variety that seems peculiar to Vienna is the type of pass which is not good for a ride in itself but which entitles the holder to a reduced rate—just like the Schaddelee monthly personal ticket—except that no service charge is involved. Such a pass is granted, for example, to residents along the trackless trolley extension, inasmuch as they are already penalized for higher fares through being long riders on the city system; or it may be granted to employees of certain factories; to school children, etc. In many cases of this kind, identification as to person and residence must be attested by the captain of the local police precinct! Obviously, American car riders would be unwilling to go through such procedure.



LONDON ELECTRIC RAILWAY.

APPLICATION FOR SEASON TICKET.

To be issued direct at the Season Ticket Office, Oxford Circus Station, or on 24 hours notice through a Station Booking Office.

THE COMPANY RESERVE THE RIGHT TO DECLINE TO ISSUE SEASON TICKETS.

Name in full ____________________ ____________
(Mr., Mrs. or Miss)

Residence ____________________________________

________ *Class* ______ *Months. Commencing date* ______________ *19* ____

Between ______________ *and* ______________ *Stations.*

Route ____________________________

IF HALF-RATE TICKET IS DESIRED, PLEASE STATE HERE AND ATTACH THE NECESSARY CERTIFICATE } ____________________

If remittance enclosed, please state amount here: £ : s. d.

Cheques should be drawn in favour of "London Electric Railway Co., or Order," and crossed "Williams Deacon's Bank Ltd."

Please give particulars of present or last ticket held } *Number* ________ *Date of expiry* ____________

If Ticket to be called for at a Station, please state name of Station here: ____________

CONDITIONS OF ISSUE.

I agree to accept the Season Ticket issued to me or any further Ticket in continuation or renewal thereof subject to the Regulations and Conditions as set forth on the back hereof, and I agree that the acceptance of a Season Ticket by me shall be held to constitute the acceptance of the aforesaid Regulations and Conditions.

Signature of Applicant ____________________

To the CHIEF PASSENGER AGENT,
LONDON ELECTRIC RAILWAY,
Season Ticket Office,
OXFORD CIRCUS STATION,
ARGYLL STREET, W. 1

(SEE BACK.)

Application for Season Ticket
[illegible]

REGULATIONS AND CONDITIONS UNDER WHICH SEASON TICKETS ARE ISSUED.

1. Season Tickets are issued and must be used subject to, and in conformity with, the Bye-laws, Rules, Regulations and arrangements from time to time in force on every Railway over or on which the said tickets are available, including alterations in the number and times fixed for the starting or arrival of trains. The Company is not under any circumstances whatsoever to be held liable for any consequences arising from such alterations nor for want of accommodation in any train nor for any detention or delay in the starting or arrival of trains.

The Company is not under any circumstances whatsoever to be held liable for the discontinuance, whether permanent or otherwise, of the running of any trains or for any consequences arising from such discontinuance.

3. Season Tickets are only available at and between the Stations named thereon, including (unless otherwise stated) intermediate Stations. If used to a Station beyond, the full single ordinary fare is payable for the additional journey travelled.

4. A Season Ticket is not transferable, and if transferred will be forfeited, and both the person using it and the person who transferred it will be liable to prosecution.

5. A Season Ticket is issued on the express condition that it is not available for any journey unless it is produced on demand to any Officer or Servant of any Company over any portion of whose line such ticket is available, or at an exchange point, or en route, or at any Station where the holder has travelled to, to which the Season Ticket is not available. If such ticket is not so produced, the holder thereof shall be deemed not to have paid the fare for that particular journey, and such fare shall be recoverable by the Company from such holder. No refund of such fare will be made.

6. Should a Season Ticket be lost, immediate notice must be given to the issuing Company. The holder of the original ticket is not entitled to a duplicate ticket, but a duplicate may, in the discretion of the Company, be issued upon payment of a charge of 10% of its unexpired value (minimum charge 2/6, if the original ticket was issued for a period of more than one month, or 1/- for a period of one month.) Should the original ticket be subsequently found it must be at once returned to the Company.

7. A Season Ticket is the property of the Company and must be surrendered to the issuing Company immediately on its expiration. A Season Ticket which has not been surrendered on its expiration will not be renewed from any other date, and should an interval occur between the expiration of the old ticket and the date on which the new ticket is taken up, no application for the refund of fares paid in the interim will be entertained.

8. Any holder of a Season Ticket travelling in a class of carriage superior to that for which the ticket was issued must pay the difference between the ordinary single fares for the respective classes.

9. The holder of a Season Ticket is not entitled to priority of place over other passengers. The Company will not bind itself to carry such holder in any particular train or class of carriage, and if the holder travels by any train not provided with the class of accommodation covered by the ticket, the difference in fare will not be refunded.

10. The Company may decline to issue or renew a Season Ticket.

11. A Season Ticket is liable to forfeiture if there be a breach of any of these Regulations and Conditions.

12. If the Ticket be defaced or become illegible, the holder shall return it to the Company, who will issue a new one in exchange at the charge of one shilling.

13. The acceptance of a Season Ticket will be held to constitute an acceptance of the Regulations and Conditions set out above.

EXPIRED SEASON TICKETS.

Passengers are requested to return expired Tickets by post or otherwise to the Company's Season Ticket Office, or to one of its Booking Offices, or to the Chief Passenger Agent's Office, so as to reach the Company not later than the day after the date of expiry.

FRONT AND BACK OF ONE OF THE SIMPLER FORMS OF APPLICATION REQUIRED IN EUROPE FROM THE PERSON DESIRING TO PURCHASE A PASS (OR SEASON TICKET)

GENERAL EUROPEAN SURVEY

As regards pass inspection abroad: On surface lines, the pass is inspected by the conductor "on the nod," to use a British expression. It is also subject to a second visé by the inspector who makes surprise boardings to see that the passenger has either a receipt for fare paid or a pass. On the London Underground, the pass is viséd on entering the station and again on leaving the station. The single-trip rider gives up his ticket at the exit station. No registration devices are used on Continental tramways, but some German street railways have taken up locked fareboxes lately. British tramways use a portable bell punch for perforating and counting fare receipts at the same time. The only British registration devices, outside of these punches, are the London Underground Railways' cash registers, which are used at the more important stations to record excess fare upon the exit of over-riding passengers. These practices are worth keeping in mind because of the basic difference from the American schemes of collecting and recording fares.

It will be observed from the foregoing that all of the foreign passes are restricted to the purchaser. This has always struck the writer as unenforceable, unnecessary and annoying. The larger the city, the greater the difficulty of identifying the bearer as the purchaser; and supposing it were possible to get information, the conductor would have no time for such palaver during rush hours. The restriction is also unnecessary in that the pass is a thing of value that the owner parts with only in exceptional cases. The restriction is annoying in compelling the patron to visit some central office and go through a lot of red tape. It is only on the London Underground that the latter procedure is simplified through having a pass agency at every station. Such rules compel a great deal of clerical work although there is an offset in the reduction of tickets and change-making required.

Having tested these restrictions by riding freely on the passes of others, the writer concluded that it was not worth while to promulgate rules that are difficult if not impossible to enforce. Therefore, the weekly pass has been made fully transferable, and this transferability has been made a selling point. People always will want to do as they please with their own. If they resent restrictions, they will welcome an invitation to

"Go to it and give the pass to anybody, provided it is used for but one ride at one time."

The limitation of the pass to a month or more also seemed unnecessary. Such long periods prevent the working classes and clerical people from purchasing them because they cannot lay out the necessary amount in advance. Hence we have the situation that those who get the lowest fares are those who could best afford the highest rates. The natural antithesis is the uneconomic workman's limited-hours rate. It seemed better to put the pass on the shortest practicable basis—one week—and to charge more than twelve single-trip fares for the same. In this way, the ratio of passholders and riders in American cities has already grown greater in months than it became abroad after a generation; and instead of getting less per diem from these wholesale riders, the American operator gets more.

DIVERGENT OBJECTS OF THE MONTHLY PERSONAL TICKET AND WEEKLY TRANSFERABLE PASS

Both the monthly personal ticket and the weekly transferable pass have seen enough service to give some idea of what each accomplishes. As might be expected, applications have already been made to conditions that were not originally held of first importance. Thus, the pass put on at Racine in lieu of a zone fare has proved exceedingly effective at Youngstown in cutting jitney competition; while the monthly ticket intended at Mason City and Muscatine to grant a low rate to regular riders while raising the fare to casuals has also been instituted at Joliet, although the maximum fare of 10 cents had already been attained there. No two of the cases are alike, yet some interesting speculations are permissible on the basis of the results attained.

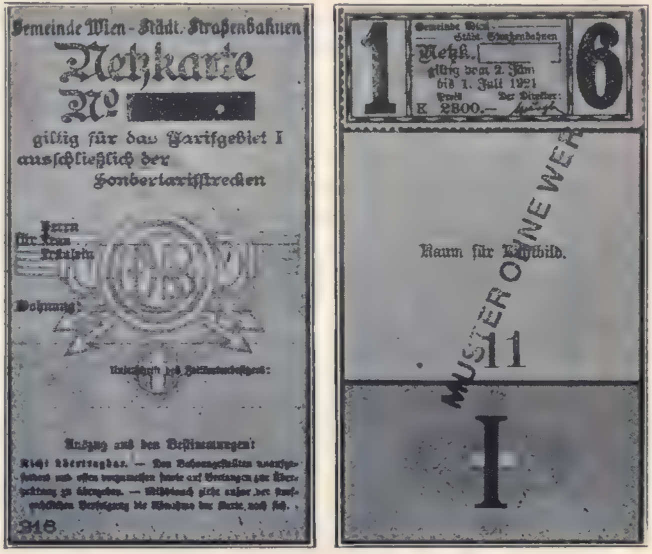
Thus in any given city, one would find more buyers for the monthly ticket than for the weekly pass, because it is easier to secure 50 cents a month than 85 cents, $1, $1.25 or more per week. Also, the monthly ticket holder averages fewer rides than a weekly passholder because he still has to pay money each time. On the other hand, the big reduction which even two rides a day means to him, makes it essential to induce a ticket user to ride at least two and five-tenths to three times a day to be a profitable customer. Contrariwise, the weekly passholder having paid for all his riding in advance uses the service at will and is sure to average a much greater use of the service, although it is obvious he cannot take more than two rush-hour rides in any case. Figures to illustrate these points may now be given.

THE MONTHLY TICKET TO DATE

Mason City, Iowa, has had monthly tickets since August, 1920. These were put on when the standard 5-cent fare was raised to 10 cents. The company did not push the sale of the ticket, so as late as January, 1922, this city of 20,000 had but 524 ticket holders. On the other hand, Muscatine with 16,000 people shows the result of a good advertising campaign, for there the number of tickets sold in January, 1922 (the third month of use), was 1,261. It seems likely that the average Mason City passholder is a bit wealthier, for transportation bargains are snapped up by the well-to-do first. At any rate, the Mason City ticket holder averaged 2.267 rides a day at a net cost of 5.782 cents per ride, yielding the company 13.1 cents a day against a cash fare of 10 cents or 91.7 cents a week. Ticket riders brought 39.25 per cent of the traffic and 28 per cent of the revenue.

The Muscatine advertising campaign cut deeper into the labor ranks, for the average passholder took only 1.777 rides a day at 6.033 cents net, yielding the company 10.7 cents a day against 10 cents straight cash or 74.9 cents a week. Ticket riders brought 52.6 per cent of the traffic and 42.8 per cent of the revenue. In November, 1921, the first month of the ticket, the change from a 7-cent to a 10-cent fare coincident with this reduction plan produced an increase of 11 per cent in daily revenue but a drop of 6.6 per cent in patrons, there being 98,819 riders for thirty days of November against 108,916 riders in thirty-one days of October. By January, however, the casuals seem to have returned, in addition to a little more riding by ticket holders (from 1.732 to 1.777 rides a day), making the traffic total 116,013.

To summarize Mason City and Muscatine: The monthly ticket plan seems to have resulted so far in granting a much lower rate of fare to people who ride chiefly in the rush hours. This is bound to be the case until the average rides are raised to three a day or twenty-one a week, at which figure the ticket holder will yield 21 × 5.55 cents or $1.17 a week in 10-cent fare communities.


Gemeinde Wien - Städt. Straßenbahnen

Netzkarte

No [redacted]

gültig für das Tarifgebiet I ausſchließlich der Sondertarifſtrecken

Herrn
für Frau
Fräulein

Wohnung:

Unterſchrift des Karteninhabers:

Auszug aus den Beſtimmungen:

318

1 Gemeinde Wien Städt. Straßenbahnen Netzk. giltig vom 2. Juni bis 1. Juli 1921 Preis K 2800.— Der Direktor: 6

Raum für Lichtbild.

MUSTER OHNE WER

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THE VIENNA PASS HAS SPACE FOR A PHOTOGRAPH OF THE HOLDER AND IS NOT TRANSFERABLE

Another of Mr. Schaddelee's properties, the Tri-City Railway of Illinois (Moline, 30,700 and Rock Island, 35,200) installed the personal monthly card on March 1, 1922, at 50 cents against (new) 10 cents and 8⅓ cents adult and 4-cent (old) children's fares. During April, 54 per cent of the riding and 37 per cent of the revenue came from card riders. These riders paid 5.9 cents fare and averaged 1.73 rides a day.

At Joliet, on introducing the ticket plan without change Jan. 1, 1922, in the standard fare of 10 cents then in force, the management said that it expected more riders but less revenue from its use. Information at hand for January is to the effect that the average rate of fare was cut from 9.7 cents to 8.7 cents, or 9.4 per cent. The increase in riding was not sufficient to offset this, but there was some increase in net earnings owing to a wage reduction.

THE WEEKLY PASS TO DATE

The conditions under which the pass was installed at Racine were not favorable for a publicity campaign. The sales, therefore, have not been as high as they might have proved with a more favorable start. However, there was an increase in revenue almost from the first week.

At the same time, it has always been difficult to say what proportion of the gain was due to the pass and what was due to rising industrial conditions and the later introduction of improved service with safety cars. It is known, however, that the average number of rides taken was about four per business day and about twenty-six per week. Count of pass riders is no longer made. The Racine pass buyer yields 14.3 cents a day or $1 a week against a 7-cent cash and 5⅝-cent ticket fare. February, 1922, sales were on the order of 2,100 a week. During the depression, the pass sales have suffered less than cash and ticket sales—actually being ahead of the preceding year until the first months of 1922. This proves that the weekly pass tends to get more revenue out of the well-to-do, but that it does not attract the poorest paid class of riders so well as the monthly ticket. The proportion of revenue from passes has ranged from 15 to 18 per cent; and it may be estimated that the proportion of traffic from passholders is 25 per cent or more. A special check in the early days of the pass showed 13.8 per cent revenue and 19.7 per cent rides as the respective ratios to total revenue and riding.

At Kenosha the traffic suffered severely because of a bridge reconstruction along the main line. When 498 passes were sold, they brought 15 per cent of the revenue and about 20 per cent of the riding. The pass here is also sold for $1 against 7 cents cash and eight for 50 cents tickets, bringing in 14.3 cents for every day in the week.

At Youngstown the pass was favored by the circumstance that there was 10-cent and 8⅓-cent jitney traffic to capture in addition to creating traffic. The pass costs $1.25, yielding 17.9 cents a day against 9 cents cash and 8⅓ cents ticket and 1-cent transfer.

In the period Sept. 19, 1921 (before advertising and using the pass), to April, 1922, it had seen an increase of more than 50 per cent in traffic and 30 per cent in revenue with but 15 per cent increase in car-miles, although thirty-two-seat safeties were going on in place of thirty-six-seat double-truckers. Excellent, unremitting publicity seems to have done much to promote pass sales from the original 4,200 to 8,100 during recent weeks. The price is also very favorable, being but 20 cents a week more than the cost of twelve ticket rides. The ratio of pass riders is as high as 43 per cent and the revenue from pass riders is more than 30 per cent of the total. Although Youngstown is much bigger than Muscatine, Mason City or Joliet, which are of ideal size for home-lunch rides, the average number of "origin-to-destination" rides by weekly passholders is in excess of 3.3 a day, which shows that people can find plenty of reason for riding once they have been induced to pay for all of it in advance.

The Indiana Service Corporation of Fort Wayne is also on a $1 basis against a 7-cent cash fare, and four for 25 cents ticket fare. Its first week (Feb. 27-March 5, 1922) showed a sale of 3,100 passes; and later cool-weather weeks showed sales up to 3,872. As the Fort Wayne case is not complicated by jitney competition, it is worth noting that a comparison of eight weeks before the pass inaugural in 1922 and 1921 showed the 1922 period to be dropping behind at the rate of $324 a week. The comparison of the following fifteen weeks of each year shows that the 1922 period ran ahead $575 a week, making a total gain of $899 a week, which is between 4.5 and 5 per cent improvement in gross. The car-miles in the first eight 1922 weeks or non-pass period were 4.3 per cent ahead of 1921 but in the pass weeks only 2.8 per cent ahead of 1921.

CONCLUSION

Lack of space forbids more extended general discussion of pass experiences to date. However, it is proper to say that no user of the weekly pass believes it has cut his revenue. All agree that it has speeded operation and improved good will; and some have been kind enough to say that it has either protected or enhanced their revenue.

Iowa Midyear Meeting in Sioux City

THE midyear meeting of the operating heads of the Iowa Electric Railway Association will be held in Sioux City, Iowa, on Nov. 2 and 3. The program, which is still under preparation, will be published in an early issue.

American Association News

Conference of Interurban Companies

A CONFERENCE of all interurban companies interested in the construction of section 15A of the transportation act with respect to whether these companies come under the provision in regard to earning a 6 per cent return wil be held on the pier some time during the convention.

The meeting of interurban men has been called at the request of Charles L. Henry, chairman of the committee on national relations, and at the request of several interurban companies which fear that the claim may be made by the Interstate Commerce Commission that "they are engaged in the general transportation of freight." A notice to interurban member companies in regard to the conference issued by Mr. Henry suggests that in the meantime, if the Interstate Commerce Commission has asked for reports from them, on the ground that they are included in the transportation act, they should write the director of the Bureau of Finance, Interstate Commerce Commission, requesting that no decision be made in the matter until after the convention, when the matter will be taken up for consideration.

The meeting will be held in a room provided in Section G at the center of the Municipal Pier, and suitable notices will be placarded on the pier indicating the time and location. Unless otherwise announced the meeting will be held at 3 p.m., Thursday, Oct. 5.

Meeting of Committee on Nominations

THERE will be a meeting of the committee on nominations of the American Electric Railway Association in front of Convention Hall, immediately at the close of the Tuesday morning session.

Chairman Henry of the committee has called this meeting in order to consider the nomination of a substitute for C. K. Knickerbocker, who was nominated as a member of the executive committee but has indicated that he will not be able to accept the nomination.

California Boosters Will Be on the Job at Chicago

BY AUTHORITY of the executive committee of the California Electric Railway Association the Californians attending the Chicago convention will urge upon the executive committee of the American Association the selection of California as the place for holding the midwinter meeting in the spring of 1923.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Taxation Argument Up

Court of Appeals Hears Question on Supporting Seattle Municipal Railway by Inroads on General Tax Fund

Three judges of the United States Court of Appeals, sitting in Seattle on Sept. 19, took under advisement the question of whether Seattle property owners can be taxed for the support of the Municipal Railway, if the gross revenues of the system should ever become insufficient to meet all its obligations. This issue was laid before the high federal tribunal in the appeal of the city of Seattle from a decision of District Judge E. E. Cushman, who last spring decreed that if the revenues ever should become insufficient to pay for operating the street cars, after the installments of interest and principal on the $15,000,000 purchase bonds had been taken out, the general tax fund should be invaded to make up the deficit.

The city, represented by its attorneys, Charles T. Donworth and T. J. L. Kennedy, appeared before the court to have this decree stricken, and the Puget Sound Power & Light Company, represented by James R. Howe, appeared to have the decree affirmed. The city was assisted in its appeal by counsel for the fourteen taxpayers who in the interests of all Seattle taxpayers have been fighting in the courts of this state to preserve the general tax fund from invasion for the municipal railway.

In the decree which the city is seeking to have reversed in this appeal, Judge Cushman assumed jurisdiction over the Municipal Railway and the parties in the litigation to compel specific performance of the city's contract with the Stone & Webster bondholders. He interpreted that contract as necessitating an invasion of the tax fund, if the street car revenues should prove insufficient.

Delivering the chief argument for the city, Assistant Corporation Counsel Donworth asked that the municipal government be permitted to perform its obligations to the bondholders voluntarily, as it has done in the past. He said that the company asked the court to give it something which it never bargained for, namely, the sovereign power of taxation to guarantee its bonds.

That the statutes of the state of Washington provide no authority to municipalities to incur general indebtedness for the purchase of utility properties was pointed out to the federal judges by Robert H. Evans, who appeared as special counsel for the city in this suit. He declared that this decision was fundamentally unsound, for the Legislature of the state had not conferred upon cities the power to levy taxes for the operation and maintenance of its public utilities.

Harold Preston, counsel for the fourteen taxpayers during their litigation in defense of the general fund in the state courts, represented them before the federal tribunal. He pointed out that the Supreme Court, in its decision in the fourteen taxpayers' case, enjoined the city from using the general fund in any way for the operation and maintenance of the street railway, and that the District Court, in the Cushman decree, compelled the city to do exactly that thing. He reviewed the decisions in the so-called Twichell case and the fourteen taxpayers' case in the state courts. He said:

> The Twichell case was instituted before the street railway purchase was consummated, to determine the validity of the bonds. The question of the general fund came before the court then only as a hypothetical one. It was presented in this way: If there is a deficit in the operation of the railway, will a general obligation be created? The Supreme Court held that from the record in the case, there was no possibility of a deficit, and therefore no general obligation was involved. When in the fourteen taxpayers' suit the Supreme Court learned for the first time there was a deficit, the court held that the general fund could not be encroached upon for the operation and maintenance of the railway.

Arguing in behalf of the Puget Sound Power & Light Company, James B. Howe declared that the Stone & Webster interests accepted the $15,000,000 of bonds as valid on the basis of the Twichell decision, and that neither the fourteen taxpayers' decision nor any other subsequent decision can affect them.

Assistant Corporation Counsel Kennedy, in rebuttal for the city, declared that stripped of all disguise, the company's suit was nothing more nor less than an attempt to enhance the value of the $15,000,000 bonds by a decree of the court that would stamp them as a general-fund obligation, rather than a debenture or utility bond.

Attorney Howe's argument centered largely on proof of breach of contract in the city's failure to have money on hand Feb. 10, 1921, to meet the payment due the company March 1, 1921.

San Francisco to Vote on Municipal Railway Extension Bond Issue

The public utilities committee of the San Francisco Board of Supervisors on Sept. 13 instructed the city attorney to prepare an ordinance outlining a $1,500,000 Municipal Railway extension bond issue for submission to the voters of the city at a special election. Other bond issues are to be voted upon Nov. 21, and it is thought probable that this railway extension question can also be settled at that time.

Long Island Planning Ahead

$2,000,000 Elevated Extension Under Way—Further Electrification Proposed for the Future

The Long Island Railroad has confirmed for the *Electric Railway Journal* the statement that the ultimate electrification of the 40-mile commutation zone of the Long Island Railroad is anticipated by the installation of additional power equipment in the Long Island City plant of that system.

It was said that the road's plans to replace steam with electric propulsion will be carried out first probably on the Montauk Division to Babylon. Eventually the company hopes to electrify the entire Oyster Bay branch, and the Wading River branch to Huntington or Northport, eliminating the necessity for changing trains at Jamaica.

Another improvement would involve the connection of the old and unused Central Railroad line with the Main Line, so that the express service may be diverted from the entire Montauk Division east of Babylon, through Hicksville and Mineola to Jamaica.

According to the president, the company has concentrated its efforts during the present year upon the extension of its conduit lines to a point just west of Forest Hills. This is intended to furnish additional feeders. The construction is progressing rapidly, and before many months will be completed at a cost of approximately $240,000.

The cost of extending a third rail to Babylon will be about $3,500,000, which must be added to a cost of $1,000,000 already met by the company in the additions made to the power plant. The extension of the conduits to Winfield in the last two years has cost $300,000.

In the next few weeks the railroad will begin work on the extension of its elevated structure eastward through Hollis and Queens to the boundary line of Nassau County. That is to be a four-track extension, and it is to be completed at the end of a year and a half at a cost of approximately $2,000,000.

Increased facilities are being added to the system, according to the officials, because of growing traffic demands. It was pointed out that the necessity for additional trackage was becoming more and more urgent because of the increasing population along the Main Line and the Montauk Division in the suburban zone. On those lines it was said that additional service had about reached the limit. With reference to the short-haul city traffic on the Long Island, President Peters said:

"I have tried to impress upon the

Transit Commissioners of this city that they ought to build a four-track rapid transit line from Jamaica over the Queens Boulevard route to Long Island City, thence under the river and across the city to Tenth Avenue, intersecting all the north and south lines on Manhattan Island and giving the Borough of Queens real rapid transit.

"The city should not depend on the Long Island Railroad to furnish rapid transit, as this transportation line is needed to serve all other parts of Long Island for passenger and freight transportation."

City Joins Railway in Seeking Review

The city of Seattle has joined with the Puget Sound Power & Light Company in application for a writ of review before the United States Supreme Court in the $400,000 railway tax suit. This is the case in which King County sued the city and company for taxes on the railway for the year 1919, when the railway was purchased by Seattle. The State Supreme Court held that the taxes were a lien on the railway property, and that the city and company were required to pay approximately $400,000 to the county. The city was held liable for about $300,000 of this. Application for a writ of review constitutes an appeal to the United States Supreme Court from the decision of the State Court.

Unification Suggested

Chief Engineer Osborne of the Board of Public Utilities at Los Angeles, Cal., recently laid before the board at a special meeting a report summarizing the recent decision by the State Railroad Commission in the Pacific Electric case. He recommended a comprehensive engineering survey of the local railway transportation situation in Los Angeles looking toward a unification of the existing lines under one ownership and one operating management.

The report was adopted by the board and was forwarded to the City Council for action. Mr. Osborne said:

> With the end in view of securing a comprehensive engineering report, I respectfully recommend to your honorable body, subject to the further approval of the City Council, that a joint report be made by the Engineering Department of the California Railroad Commission and the Board of Public Utilities. This report should discuss adequately and in a comprehensive manner the three ways outlined by the California Railroad Commission to secure a unification of the two local systems into one single system under one ownership and one operating management, as follows:
>
> The Pacific Electric to take over the Los Angeles Railway.
>
> The Los Angeles Railway to take over the local lines of the Pacific Electric Railway.
>
> The city of Los Angeles to take over the Los Angeles Railway lines as well as the local lines of the Pacific Electric Railway.
>
> I therefore respectfully recommend, upon approval by the City Council, that the California Railroad Commission be requested to authorize its engineering department to participate in such comprehensive joint report, and that after conference with Chief Engineer Richard Sachse, I present to your honorable body an estimate of the time which such survey and report will require, together with an estimate of the expense involved in making such report.

Commission Rules Out Complaint of Syracuse Against One-Man Cars

The objection to one-man operated street cars in New York State seems to have reached a culmination in the decision and finding of the Public Service Commission in the matter of the complaint of the City of Syracuse against the New York State Railways as to operation of one-man cars in that city. An abstract of the opinion follows:

One-man operated street cars in New York State are of comparatively recent introduction. In "Electric Railway Transportation" by Blake and Jackson, published in 1917, a statement is made that the one-man car was then in use on more than 125 roads. In August, 1921, there were in operation 4,300 one-man standard safety cars and 1,200 converted two-man cars according to general railway statistics.

The one-man car was adopted primarily as a matter of economy on the part of the street railway corporation in the matter of dollars paid for wages. According to the decision of the Public Service Commission of Sept. 21, 1922, in the Syracuse case permitting the continuance of the one-man car, when properly equipped with safety devices, it has proved not only economical in wage saving but also in the matter of accident cost.

Statistics submitted by the New York State Railways show in the city of Syracuse from April 1 to Dec. 31, 1921, inclusive on cars operated by two men there were carried 18,219,006 passengers at an accident expense per 10,000 passengers of $18.04. During the same period 9,604,854 passengers were carried on one-man cars at an accident expense per 10,000 passengers of $14.62, a difference of $3.42 per 10,000 passengers carried in favor of one-man operation.

In the Syracuse decision one-man cars are not advocated on congested lines, but in many cities, notably Albany, where at rush hours the United Traction Company places several men at strategic boarding points to sell tickets and make change for passengers, this type of car has proved its superiority both in loading and the discharge of passengers.

One-man cars are equipped with such safety devices that immediately the hand leaves the control the car automatically stops. The most of the accidents in connection therewith are of a minor nature.

From the standpoint of service on the average line the one-man car should not run more than two minutes behind the average two-man car schedule.

Single and double truck cars are operated within this state by one man in the cities of Poughkeepsie, Hudson, Albany, Troy, Schenectady, Amsterdam, Utica, Oswego, Binghamton, Elmira, Buffalo, Niagara Falls, part of Greater New York and many suburban lines. Public utility commissions of the states of Massachusetts, Connecticut, Missouri, Wisconsin, Rhode Island, Idaho, New York, Tennessee, California, New Hampshire and Illinois have approved their use.

In conclusion the commission said:

> It appears undisputed that in one-man car operation there is a saving in expenses of over $100,000 per year. This will have a material effect on determining the rate of fare. This commission feels that the public should have the service it is willing to pay for, and if Syracuse car riders are willing to pay the additional cost of two-men car operation they should have such operation. But it is apparent that they are not because of their complaint against the existing fare, at present service furnished to a considerable extent by one-man car operation.
>
> Upon the evidence in this case, the commission has reached the conclusion that the operation of one-man cars is not a serious inconvenience to the extent that it fails to give adequate service to the traveling public. The complaint should therefore be dismissed upon the condition that the company complete at once the installation of the safety devices on all cars operated by one man and comply with the suggestions of the commission in reference to safety of operation at grade crossings.

New Richmond-Cincinnati Company to Operate

A new interurban company has been formed to take over the old New Richmond & Cincinnati Interurban, now several months abandoned, lay new tracks and operate an electric line of passenger and freight service between Cincinnati and New Richmond, Ohio. This announcement was made by Lawrence Langdon, general counsel of the Union Gas & Electric Company and attorney for the new Cincinnati-New Richmond Railway Company.

Associated with Mr. Langdon are William Harton, general manager of the South Covington & Cincinnati Street Railway; Frank Woods, superintendent of the former New Richmond & Cincinnati Traction Company, and Walter Beaty, Cincinnati electrical engineer. According to Mr. Langdon the company will be incorporated with officers as follows: Mr. Harton, president; Mr. Langdon, vice-president; Mr. Beaty, secretary and treasurer, and Mr. Woods, manager.

The new company will take over the present franchise of the old company to operate its cars through Cincinnati streets to Stanley Avenue, where the Cincinnati terminus of the line will be located. A new franchise, however, will be sought in the Cincinnati Council.

The Council of New Richmond has already voted to give the company a franchise to operate its cars and to supply the town with electricity. The new company will lay standard gage tracks and communicate with the Pennsylvania Railroad along its route. A freight business will be carried on.

New Richmond at present is without interurban transportation. The New Richmond & Cincinnati Traction Company abandoned its service about four months ago. The line which was built in 1901 was known as the Eastern Division of the Interurban Railway & Terminal Company, which has also abandoned its only other division operating from Cincinnati to Lebanon.

Power to operate the interurban line will be furnished by the Union Gas & Electric Company.

Accepts Previous Proposals

With a View to a Five-Cent Fare the City and International Railway Representatives Will Meet

Herbert G. Tulley, president of the International Railway, Buffalo, sent a letter to Mayor Frank X. Schwab Sept. 27 accepting the proposals previously made by the Mayor calling for a conference between representatives of the city and the railway company with the view to the adoption of a plan whereby the 5-cent fare may be re-established in Buffalo. The International is now charging a 7-cent fare or four tokens for 25 cents.

In his letter to Mayor Schwab, President Tulley said:

> Acknowledging receipt of your letter asking the company to enter into negotiations with a view to the adoption of a system under which the 5-cent fare may be restored in some form and relations established similar to those existing in the city of Cleveland with such modifications as are practicable and applicable to Buffalo, I beg to say that the representatives of this company will be glad to negotiate with representatives of the city to determine what, if anything, can be done toward meeting your views.

The favorable reply from Mr. Tulley came as a big surprise to members of the City Council especially in view of the fact that responsibility for the strike which has crippled the company's lines since July 1 has been placed by officials of the International squarely upon Mayor Schwab and other members of the city goverment. Several members of the City Council already have expressed themselves as willing to become members of the commision to negotiate with the International. Frank C. Perkins, the Socialist member of the Council, said the negotiations may result in municipal ownership for the local traction lines.

In an interview, President Tulley is quoted as saying:

> If it is possible to give Buffalo a 5-cent fare, Mitten Management wants to do so, but I can say that much ground will have to be gone over in our discussions and many obstacles overcome before any fare reduction is possible.

The City Council already has voted to use a fund of approximately $50,000 to bring a rate case before the Public Service Commission as the first step in its fight for lower street car fares on the local lines of the International.

STRIKE EMERGENCY PASSED

Strike pay amounting to $7.50 a day for emergency trainmen who have been operating the local and interurban cars on the lines of the International Railway, Buffalo, since July 1, will be discontinued on Oct. 1, according to announcement made by President Herbert G. Tulley. It is explained that the strike emergency has now passed and that all trainmen will hereafter be paid 55 cents an hour, the regular maximum rate on a straight time basis.

The higher rate of pay which has been in effect since the strike was called on July 1 by the Amalgamated was offered by the International because of the hazard involved in the operation of cars.

The International Railway now has recruited a permanent operating staff and many employees are now on the extra list. Many strikers have deserted the ranks of the union and are now operating cars on local and interurban lines. Only such other strikers will be taken back as indicate their willingness to comply with the Mitten plan and then they will be given places on the extra list at the end of the seniority list.

Beginning September 25, the International resumed local service in the city of Niagara Falls. Local service has not yet been started in the city of Lockport, but normal service is being given over all Buffalo local and western New York interurban lines.

Penitentiary sentences are being imposed by Justice Pooley in Supreme Court to jitney drivers and striking employees of the International who have been found guilty of contempt of court for violations of injunctions.

THIRD INJUNCTION AGAINST JITNEY OPERATORS

A third injunction restraining jitney operators from running cars in the streets of Buffalo has been issued by Justice Pooley in the Supreme Court upon application of Henry W. Killeen of Penney, Killeen & Nye, attorneys for the International. About 150 individuals are named in the third injunction.

Samuel Gompers, president of the American Federation of Labor, spoke in Buffalo last week at a meeting designed to stimulate the morale of the strikers. In his speech, Mr. Gompers assailed the use of injunctions to curb the activities of strikers.

Railway Men Choose Books

The McAlpin Hotel in New York decided recently to put in its library a number of technical books, and in order to determine what books they should be, sent letters to a number of the leading members in the different industries. Returns are now being received, and it is understood that the books will be added. Among those who have given their selections of electric railway books, from which the final choice will be made, are:

T. L. Cross, Baltimore; James W. Welsh, New York; Lucius S. Storrs, New Haven; Van Horn Ely, Philadelphia; Franklin T. Griffith, Portland, Ore.; E. M. Herr, East Pittsburgh; W. F. Ham, Washington; J. H. Pardee, New York, and Percy Ingalls, Newark, N. J.

Want More Utilities in Association

Intensive study of common problems and the enlisting of more of the public utilities eligible for membership were two things determined as a policy to be followed by directors of the Southwestern Electric & Gas Association at a meeting in the office of E. N. Willis, secretary, Dallas, Tex. There are 175 public utility concerns in Texas and Louisiana, the territory of the association, now members and there are eighty associate members. About 100 more utilities are on the eligible list.

Chicago "L" Sells About 18,000 Passes First Week

The riders on the Chicago Elevated have not yet awakened to the possibilities of the weekly pass, which became effective on Sept. 18. The first week's sales were around 18,000 for the $1.25 ticket and rough checks have shown that each pass was used for an average of three rides daily. Complete figures have not yet been compiled due to the extra accounting work involved with the complete revision of the fare schedule, which provides cash and ticket rates and a complex reduced children's and school fare.

So large a percentage of the elevated riders use the lines only twice daily that they have taken the fare reduction in the form of the lower three-for-a-quarter ticket rate. The tickets were four for 35 cents. It is understood that the ticket ratio has increased from 67 per cent to around 80 per cent. Assuming the same traffic as last year this decrease of 0.42 cent per ride will mean a loss of nearly $600,000 in revenue, while a further loss will occur from the much lower children and school rates.

Early reports indicate that the type of pass user is one to whom the flat rate meant an immediate saving. Companies whose business required much local traveling by employees purchased the passes in 90 and 100 lots. The Elevated has been handicapped by the short time available to popularize the pass so it is doubtful whether or not any additional traffic has been gained. As a percentage of the 500,000 daily riders, the pass rides constitute about 10 per cent. Undoubtedly this ratio will gradually build up as the advantages of the pass are realized.

Recommends Broad Street Subway

In a report to the City Council of Philadelphia, City Transit Director Twining has urged the construction of a North Broad Street subway from the City Hall to Olney Avenue. It was in response to a resolution introduced in the Council asking the transit department for estimates on the cost of the subway, and a Broad Street elevated line that the report was prepared.

The cost of the tube is estimated by Director Twining at $50,400,000 for 6 miles of roadway with equipment. Mr. Twining said that a four-track elevated structure on Broad Street would cost $20,000,000 less than the four-track underground line but said that the extra $20,000,000 would prevent Broad Street being disfigured.

Wages Cut Ten per Cent

Wages of employees of the Gary & Southern Traction Company at Gary, Ind., have been reduced 10 per cent, effective on Oct. 1, it has been announced. Officers of the company said it was necessary to make the cut if the line were to continue in operation. The employees have been receiving 60 cents an hour.

Financial and Corporate

Net Income of Detroit Municipal Continues to Increase

The August report of the Department of Street Railways, Detroit, Mich., shows that mileage and revenue increased and expenses were less for the month. After all charges were met, including operating expenses, interest on notes, sinking fund on the original municipal ownership bonds, purchase contract, bonds authorized at the time of the purchase of the Detroit United Railways, interest on the original municipal ownership bonds and interest on the Detroit United Railways purchase contract, a net income of $114,801 remained. This is $13,909 more than the July figure.

Operating cost, which represented 74 per cent of the income in July, was reduced to 72.8 per cent in August with operation of 112,509 car miles more than in July. This fact Mayor Couzens pointed out as indication that service is being improved.

Operating expenses for August were given as $1,097,270, a decrease of $6,171 under July. Out of this sum interest on notes to the amount of $10,421 has been paid and also a sum has been set aside amounting to $333,178 for sinking funds, etc. The August statement of operation follows:

CITY OF DETROIT

Department of Street Railways

INCOME STATEMENT AND OPERATING STATISTICS, AUGUST, 1922, COMPARED WITH JULY, 1922

Operating Revenue	August, 1922 31 Days	Cents per Car-Mile	July, 1922 31 Days	Cents per Car-Mile
Revenue from transportation				
Passenger revenue	$1,507,158		$1,489,136	
Parlor, chair and spec. car revenue	62		109	
Total	$1,507,220	.3680	$1,489,245	.375
Revenue from other railway operations				
Station and car privileges (adv.)	$8,551		$7,390	
Rent of track and facilities	86,487		85,678	
Miscellaneous	4,575		2,482	
Total	$99,613	.0243	$95,550	.024
Total operating revenue	$1,606,833	.3923	$1,584,795	.399
Operating expenses				
Way and structures	$133,703		$181,977	
Equipment	110,705		98,930	
Power	155,577		140,091	
Conducting transportation	569,336		564,210	
Traffic	183		119	
General and miscellaneous	127,766		118,114	
Total operating expenses	$1,097,270	.2679	$1,103,441	.278
Net revenue railway operations	$509,563	.1244	$481,354	.121
Deduct taxes assignable to ry. oper. and miscellaneous rents	$54,574	.0133	$54,574	.014
Net operating income	$454,989	.1111	$426,780	.107
Non-operating income				
Net income from miscellaneous property	$2,743		$569	
Income from unfunded sec. and accounts	670			
Total non-operating income	$3,412	.0008	$569	
Gross income	$458,401	.1119	$427,349	.107
Deductions				
Pro rata sinking fund provision on $15,000,000 original bond issue	$37,748		$37,748	
Pro rata reserve on D.U.R. purchase contract	142,015		142,015	
Pro rata sinking fund provision on $4,000,000 bond issue	11,111		51,260	
Pro rata interest fund provision on $15,000,000 bond issue	58,583		10,245	
Pro rata interest fund provision on $4,000,000 bond issue	10,422		85,189	
Pro rata interest fund provision on deferred payments on D.U.R. purchase contract	83,721			
Total deductions from gross income	$343,600	.0839	$326,457	.082
Net income	$114,801	.0280	$100,892	.025
Ratio operating expenses to revenue from transfers		72.8 per cent		74 per cent
Ratio operating expenses to operating revenue		68.3 per cent		70 per cent
Ratio net income to operating revenue		07.1 per cent		6 per cent
Revenue car-miles operated	4,087,962		3,975,552	
Non-revenue car-miles operated	7,668		7,569	
Total car-miles operated	4,095,630		3,983,121	
Earnings per car-mile		.3680		.375
Earnings per car-hour		1.9336		1.946
Expenses per car-mile		.2679		.278
Expenses per car-hour		1.4078		1.440
Revenue passengers carried	28,183,105		27,838,688	
Transfer passengers carried	9,189,043		9,065,737	
Total passengers carried	37,372,148		36,904,425	
Ratio of transfer passengers to revenue passengers		32.6 per cent		32 per cent
Revenue passengers per car-mile operated		7		7
Transfer passengers per car-mile operated		2		2
Total passengers per car-mile operated		9		9

New Orleans Company Incorporated

The New Orleans Public Service Corporation has been incorporated with the reorganization completed on Sept. 27. R. S. Hecht was made the permanent chairman of the Board of Directors; A. L. Kempster, vice-president and general manager; H. A. Ferrandou, treasurer; J. H. DeGrange, secretary, and O. B. McCoard, auditor.

The 7-cent fare became effective midnight on Sept. 27. In accordance with the ordinance settlement, Commissioner Maloney announced that he would now give attention to the survey by the Beeler organization including rerouting and other important matters for more efficient car service.

Joseph Bourdette, Jr., and Freda Bourdette, owners of $63,000 of the company's 4½ per cent bonds, have withdrawn the suit brought by them attacking the legality of the foreclosure sale of the properties of the New Orleans Railway & Light Company. Judge Rufus Foster returned hurriedly to New Orleans from New York specially to try the new issue presented by the suit, which would have blocked the reorganization of the company and prevented the reductions in street car fares and in gas rates from being put into effect.

The action brought by Augusta Du Buisson against the company for failure to satisfy a judgment for $10,000, which she had obtained against the company for personal damages, was also withdrawn. Mrs. DuBuisson alleged the foreclosure proceedings of the company and the contemplated reorganization endangered her interests. It is understood that both complaining parties have been assured that their rights would be fully protected.

R. S. Hecht, chairman of the bondholders' protective committee, and C. C. Chappelle, representing the junior security holders, were in court at the conclusion of the proceedings, and announced later that the withdrawal of these suits removed the last obstacle toward the reorganization of the company.

The papers confirming the sale of the company's property were signed on Sept. 19 before Judge Foster by all the officials and the representatives of the shareholders interested in the case.

Extension of Bond Maturity Announced

All holders of the first mortgage 5 per cent gold bonds of the Rockford & Interurban Railway, Rockford, Ill., due Oct. 1, 1922, are requested to deposit their bonds for extension with the Continental & Commercial Trust & Savings Bank, Chicago. An official statement says that payment cannot be made at maturity "as it is impossible to sell or secure underwriting of a new refunding issue under existing conditions." The terms of extension provide a maturity date on Oct. 1, 1930, at the same rate of interest.

Glasgow Celebrates

Elaborate Ceremonies Attend Observation of Fiftieth Anniversary—Balance Reported for Year

Glasgow has figured prominently in the public eye during the last month in the matter of tramways. The jubilee of the city's tramway system, a renewal of the agitation for the reduction of fares, and a warm discussion over the acceptance of an American contract for the supply of special trackwork in turn occupied the city's attention.

The jubilee celebration bulked large. Each employee received a gratuity of £1. The appointed day was Aug. 18, the fiftieth anniversary of the first car route in the city. In the presence of great crowds of people a procession of three cars carrying members of the Town Council and other notabilities passed over the 2½ miles of the original route. The first was a horse car drawn by three horses as in the original days of the Glasgow Tramway & Omnibus Company, a postilion being a prominent figure. Then came an electric car of the type first used by the municipality, and finally one of the modern electric cars with the upper deck covered.

The driver and conductor of the horse car were old servants of the tramway company, which was superseded when the Town Council took over operation in the early '90s. The municipal band headed the procession. A luncheon was afterward given by the Corporation in the City Chambers. It was attended by over 400 guests, among whom was the veteran J. Barber Glenn, who was the first secretary of the Glasgow Tramway in 1872, and who is still at work as a tramway company director in London. In the evening a reception was held which was attended by about 1,500 guests, who were welcomed by Lord Provost Paxton and Mrs. Paxton.

NO FARE REDUCTION

In regard to fares on Glasgow Tramways, the question of reducing them was again debated by the tramways committee on Aug. 16, and in particular a proposal by the Labor party to reintroduce halfpenny fares for short stages was discussed. The latter proposal was defeated by fifteen votes to eleven and one committee decided that there should be no reductions. This was confirmed by the Town Council on Aug. 24, the proposal for reduction being dropped.

The wisdom of the decision not to reduce fares is confirmed by the figures contained in a long report by Mr. Dalrymple, the general manager, on the subject of fares. He showed how the last increase of fares, decided on to meet growing working expenses, had changed a deficit into a surplus. Owing to the slump in trade, however, the weekly revenue was now less than a year ago, and for the current financial year he estimated a deficit after meeting all expenses of £50,000. If the fares were reduced, he estimated the deficiency at £434,000. He also pointed to the heavy liabilities which were being incurred for extensions and the purchase of other undertakings.

According to the twenty-eighth annual report of the tramways committee of the Corporation of Glasgow the result of operation from June 1, 1921, to May 31, 1922, shows that the ordinary income amounted to £2,350,752 and the working expense to £1,804,652, thus leaving a net revenue of £546,100. For the previous year the ordinary income was £2,392,853 and working expenses £1,937,664. The net balance for the year ended May 31, 1922, to be paid over to the common good was £149,988.

GROSS REVENUE FALLS OFF

From the revenue and net revenue accounts the gross revenue for the year shows a decrease of £53,800 compared with that of the previous year and the average traffic revenue per car-mile has decreased from 21,307d. to 20,845d. The working expenses show a decrease of £133,012. The passengers carried from June 1, 1921, to May 31, 1922, were 431,372,473 against 447,601,811 for the year previous.

The sum of £3,500 has been placed to the credit of the Employees' Liability Fund for the year to May 31, 1922. To the company's own fidelity risk the sum of £225 has been placed to the credit of the fund for the year to May 31, 1922. During the year £186,743 was expended on the upkeep of the track.

Wisconsin Companies Consolidate

The Wisconsin Securities Company, Milwaukee, plans to combine seven public utility companies, supplying gas, electricity and electric railway services to more than 200,000 persons, according to Clement C. Smith, president of the company. The united companies will operate under the name of the Wisconsin Public Service Corporation, with a capital stock of $5,000,000, half common and half preferred.

The new company will control the following public utility properties now owned or controlled by the Wisconsin Securities Company. The Wisconsin Public Service Company, supplying Green Bay and its suburbs with electric light, power, gas and transportation services; Sheboygan Gas Light Company, Menominee & Marinette Light & Traction Company, Calumet Service Company, operating at Chilton and Brillion; Manitowoc and Northern Traction Company, operating an interurban electric line between Manitowoc and Two Rivers, and the Peninsula Service Company, furnishing electric power to Kewaunee, Algoma and Sturgeon Bay.

The principal officers of the company are Clement C. Smith, president; J. P. Pulliam, vice-president; Howard Greene, secretary; H. C. Mackay, treasurer; W. M. Chester, assistant secretary and assistant treasurer.

Financial News Notes

Permission Given for Bond Issuance.—The Georgia Railroad Commission has granted permission to the Valdosta Street Railway to issue $100,000 in bonds. The railway's application was referred to in the *Electric Railway Journal* issue of July 15.

Interests Sold.—The controlling interest in the Salina (Kan.) Street Railway has been purchased by J. J. Wiesendanger, who has been elected president. W. E. Smither will retain his position as secretary, treasurer and general manager.

Receiver's Sale Announced.—Receiver Gunsul will sell the Chicago, Aurora & De Kalb Railroad property on Oct. 17 at Geneva, Ill. The company was formerly the Aurora, De Kalb & Rockford Electric Traction Company, which was sold under foreclosure in December, 1908, to Jay Morton of Chicago for about $195,000. The road extends about 28 miles.

Gold Bonds Offered.—The National City Company, New York, N. Y., is offering $2,500,000 of the first lien and refunding mortgage gold bonds of the Portland Railway, Light & Power Company, Portland, Ore., known as Series B. The bonds, dated May 1, 1922, and due May 1, 1947, are offered at 96 and accrued interest, yielding more than 6.30 per cent.

$200,000 Issue Authorized. — San Francisco-Sacramento Railroad, Sacramento, Calif., has been authorized by the Railroad Commission to issue and sell at not less than 85 per cent of their face value and accrued interest $200,000 of its first mortgage 6 per cent bonds due on Jan. 1, 1940, and to use the proceeds to finance in part estimated capital expenditures. The company reported that it will need $228,609 to pay for additions and betterments to properties consisting in general of sidings, stations, warehouses and the concreting of its tunnel. The bonds will be callable upon any interest payment date at par, accrued interest and a premium of 2 per cent of the principal.

Successor Organized to Brockton & Plymouth Road.—The Brockton & Plymouth Street Railway, which recently was sold at foreclosure to John H. Dawson, has been reorganized and the service will be resumed. Mr. Dawson has received authority from the Massachusetts Department of Public Utilities to issue $280,000 in capital stock and $260,000 in bonds in a new company, in the process of organization, to be known as the Plymouth & Brockton Street Railway. The old company had $405,000 of stock and $260,000 of bonds. Mr. Dawson and his associates will contribute $88,000 to the new company, which will operate the lines formerly maintained by the old company.

Traffic and Transportation

Seeks Increased Fares

Houston Electric Applies to Council—Jitney Competition Blamed—Improvement Program Halted

The Houston (Tex.) Electric Company, a Stone & Webster property which operates the street car system in Houston, has made formal application to the City Council for authority to increase fares from 7 cents to 9 cents to do away with the metal tokens now sold at the rate of four for 25 cents, and to increase children's fares from 3½ cents to 4½ cents. The traction company, through Luke C. Bradley, district representative of Stone & Webster, who filed the application, requested immediate action.

JITNEY ISSUE SET FOR NOV. 7

In filing the application for increased rates, Mr. Bradley informed the Council that the company is not earning a sufficient return under the 7-cent fare, due to the jitney competition, and that the outlook is exceedingly gloomy unless the city takes immediate action and stops the operation of jitneys in competition with the street cars. The traction company two weeks ago asked the city to take action to stop the operation of the jitneys on all lines except two that are not in competition with the street cars. This question was passed on to the voters to be decided at the general election on Nov. 7, and the traction company then filed application for increased fares.

In presenting this application, Mr. Bradley informed the City Council that all improvements, betterments and extensions already begun under the traction company's program to spend $1,200,000 on improvements within a year had been stopped, and that the company is now without funds or credit and that it is impossible for it to continue the improvements promised. Last January the Houston Electric Company was granted a fifteen-year extension of its franchise after extended negotiations with the city, at the end of which a compromise agreement was effected under which the traction company agreed to spend $1,200,000 in extensions and improvements. This program had already been started and it is estimated that approximately $700,000 of the $1,200,000 had been spent.

IMPROVEMENT PROMISE MADE IN GOOD FAITH

Mr. Bradley said that the traction company made its agreement with the city in good faith, believing that it could re-establish its credit, but that it had found this impossible in the face of the jitney competition. The jitneys, he said, had so reduced the earnings of the traction company that it not only cannot re-establish its credit, but that the company is now faced with bankruptcy.

The City Council acted on the traction company's application by asking the management for a more detailed statement of its operation under the 7-cent fare, by which it was shown that its net earnings during the six months of such operation had been only $20,000.

Commissioner T. L. Waugh first made a motion that the city take over the street car properties, unless work was resumed at once on the program involved in the expenditure of the $1,200,000 promised, and that the city continue to operate the system until some person competent to operate it properly could be found. This motion was lost, however, for want of a second.

Mr. Bradley informed the City Council that the information asked would be submitted within a few days. Information asked by the Council covers the following points: Amount spent on extensions and improvements since the franchise was extended last January; the kind of service furnished before and since the extension; schedules followed by cars on all lines; number of passengers carried in August and January, 1921, and the number carried during the corresponding months in 1922; what number of fares was full fares, what number half fares and what number transfers.

Selma Plans Weekly Pass

The Selma (Ala.) Electric Railway plans soon to put into effect the weekly pass plan whereby for $1 one can enjoy an unlimited number of rides for one week. The pass on sale at Ward's drug store and with all the motormen is made to bearer but may be used by anyone holding it.

Managing Director Mallory in a statement about the installation of the pass says that more traffic is needed to keep the cars running and that Selma's prosperity and progress depend a good deal upon the electric railway.

The pass is to be a thirty-day experiment. If it meets with success the sale of weekly tickets will continue, according to Mr. Mallory.

Gain in Traffic Reported Since Lowering of Fare

The Louisville (Ky.) Railway, since reducing ticket fares to 6 cents, is using a plain envelope for packing, instead of the former receipt envelopes used while the suit was pending. The same form of metal token is used, these selling at six for 30 cents, whereas they were formerly six for 35 cents, the cash and ticket fare having been the same.

Since reduction of fare to 6 cents it is reported that a substantial gain has been shown in the number of persons riding.

Rehearing on Injunction Denied

Motion for rehearing in the suit for injunction to restrain the Dallas (Tex.) Railway from collecting a 6-cent fare in Dallas was denied by Special Judge John W. Pope, who heard the original petition and denied the injunction sought by W. S. Bramlett et al. Judge Pope sustained the general demurrer of the traction company, which set forth that the action properly should be brought against the city and not against the traction company, that the 6-cent fare ordinance was legally passed by the city, and that the city had full authority to enact such an ordinance carrying the emergency clause and not refer the fare increase to a referendum of the voters of the city.

The railway set forth in this demurrer, filed by Joe A. Worsham, attorney for the company, three points on which it sought to controvert the petition for injunction. These are: First, whether the franchise granted by the city of Dallas to J. F. Strickland and C. W. Hobson in 1917 constitutes a binding contract between the traction company and the city; second, if this franchise is not a binding contract, then the City Commission has the right under its authority to prescribe a set of rates of fares to be charged differing from that set forth in the franchise, and third, whether the fare increase ordinance, adopted by the City Commission on June 24 of this year, is subject to referendum under the city charter of Dallas.

In sustaining the demurrer and explaining his attitude on the questions raised, Judge Pope said that precedent set in other cases involving the question of whether a franchise granted by a city to a utility is a binding contract had established the fact that utilities holding such franchises may go into Federal court or state court and obtain an increase in rates or fares, if the returns show that such fares or rates as already fixed afford an inadequate return on the invested capital and for the service rendered. With such precedent Judge Pope held that the City Commission was acting within its authority when it originally granted an increase in fares, and was still within its authority when on June 24 it passed an ordinance extending such fare increase for a period of one year. Such ordinance, Judge Pope held, is not subject to referendum provision of the charter.

Mr. Bramlett gave formal notice of appeal for the Fifth Court of Civil Appeals when his motion for rehearing was denied.

Opposes One-Man Cars

The Salt Lake Federation of Labor is opposing the plan of the Utah Light & Traction Company to place one-man cars on its light traffic lines in Salt Lake City. The organization has passed resolutions demanding if the company use such cars it return to a 5-cent fare instead of the 7-cent fare now in effect.

Commission Fixes Fares

New York State Railways Must Lower Syracuse Rate—Utica Fare Goes Up One Cent

The Public Service Commission has ordered a reduction in fare on the New York State Railway lines in Syracuse from 8 cents to 7 cents. This fare will be effective for a period of six months commencing Oct. 1 next and until the further order of the commission.

The 8-cent fare with four tickets for 29 cents was established by order of the former Public Service Commission of the Second District on April 19, 1921, and became effective shortly after that date. Against this rate, asserting that it was unjust and unreasonable, the city of Syracuse through its Mayor, Harry H. Farmer, on Dec. 15, 1921, filed a complaint with the commission. Hearings have been held at which a large amount of testimony and numerous exhibits have been presented by the parties. The case was submitted on briefs, the reply brief of the city being filed on Sept. 3, 1922.

In its finding the commission concluded that the company was entitled to an 8 per cent return, which in the opinion was a reasonable average return to the company upon the value of its Syracuse lines. On the other hand, the commission found that the $774,152 which represented the income available for return gave a return to the company of 8.54 per cent on $9,038,050, which the commission allowed on this property. According to the commission's finding this exceeds a fair return and the 8-cent fare complained of was, therefore, considered unreasonable and unjust.

In concluding its order the commission reviewed some facts about passenger traffic since November, 1918, when the 6-cent fare went into effect. The commission said:

> When the 6-cent fare went into effect in November, 1918, there was a falling off in passengers during the following year of a trifle less than 10 per cent. In the year ending March 31, 1920, there was a material increase and in the year ending March 31, 1921 (the 6-cent fare continuing), the largest number of passengers in the history of the company was carried. In April, 1921, the 8-cent fare went into effect and the traffic fell off in the year ending March 31, 1922, about 20 per cent. For the year ending July 31, 1922, there was a general decrease of passengers of nearly 200,000.
>
> The general industrial depression commenced in Syracuse in September, 1920, and continued to March, 1922, before relief therefrom was apparent. This undoubtedly had a considerable effect upon passenger traffic. As a further cause of reduction in traffic the company assigns the increased use of automobiles. It showed an increase in the count of Onondaga of 2,500 automobiles in the past year. The increase of fare and these other causes undoubtedly combined to decrease passenger traffic. The automobile will continue without question to affect it to a considerable extent, particularly during summer months. With a restoration of business, with a reduction in rate, we have estimated that the number of full fare passengers for the coming year will be at least 33,199,000. Dividing the cost of service, $2,309,842, by this number of passengers gives an average rate of fare of 6.96 cents, or substantially 7 cents.

At the same time as it ordered fares reduced in Syracuse the commission authorized the New York State Railways to increase its rate of fare in Utica from 6 cents to 7 cents. The increase in Utica is temporary pending determination on the application of the company for a 10-cent fare. The application for the 10-cent fare was made two years ago and was denied by the commission. The company took the matter to the courts and the Appellate Division of the Supreme Court remanded the case to the commission for further consideration.

Paducah Added to Weekly Pass Users

And now the unlimited-ride transferable weekly pass has penetrated Old Kentucky. On Aug. 28, the Paducah Railway put on the pass at $1 a week without disturbing the 10-cent cash and two for 15 cents ticket fares. A vigorous and varied publicity campaign, including car cards, advertising car, painted signs, speeches and newspaper copy was carried out by Alfred S. Nichols, manager, with such success that within the first four weeks about 25 per cent of the revenue was coming from purchasers of the pass.

Transportation News Notes

One-Man Cars in Operation.—The Public Service Railway, Newark, N. J., is running one-man cars on its Moorestown branch.

To Know the Routes by Night.—Colored lights will indicate the routes of cars operating at night on city lines of the Wisconsin Public Service Company. This innovation was the result of the printed signs not being read easily.

More Trains in Service.—The Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company, both of New York, have increased their service by 214 trains in accordance with the Transit Commission order which became effective on Sept. 25. Reports of inspectors of the commission showed that seats were provided for nearly all local passengers during the non-rush hours on both the Interborough and Brooklyn Rapid Transit cars.

Freight Rates Reduced.—New class and commodity rates on freight over the lines of the Boise Valley Traction Company, Boise, Idaho, went into effect on Aug. 28. Reductions are made in practically all classes of freight. This action is voluntary on the part of the company. An idea of the reduction is afforded by a comparison of the new and old charges in class No. 1. The new rate for class No. 1 is 25 cents for 100 lb. from Boise to Nampa. The old rate was 31½ cents.

Popularizing the Pass.—The Puget Sound Power & Light Company, Everett, Wash., is employing daily newspaper advertising in an effort to popularize the use of the $1 weekly pass recently instituted on the Everett railway lines. A recent "ad" suggested the use of the pass in the taking of self-improvement courses at the Y. M. C. A., Y. W. C. A., Commercial or night schools. It also called attention to the various public entertainments in the city, urging the free use of the pass.

Petition for Lower Fares.—Mayors and City Councils of Shawnee and Tecumseh, both in Oklahoma, have petitioned the Corporation Commission of Oklahoma to order reductions in fares charged in the two towns and also to order reduction of the fare between Shawnee and Tecumseh on the Interurban line. The Shawnee Traction Company operates the lines. Fare in the towns has been raised to 7 cents and the interurban fare between the two towns to 15 cents with the understanding at the time that the traction company would make certain improvements. The petition to the Corporation Commission sets forth that the promised improvements have not been made and the commission is asked to order reductions in the fares. Date for hearing has not been fixed.

Suspends Freight Abandonment.—Schedules which the International Railway, Buffalo, N. Y., filed with the Public Service Commission, effective on Sept. 25, providing for abandoning its freight and express service, have been ordered suspended by the commission until Dec. 30. A hearing will be held before the commission and a continuation of the present service will follow until there is a determination of the case by the board. The commission in its order holds that the rights and interests of the public may be injuriously affected by cancellation of this service. The International Railway operated a joint express or freight service with the Rochester, Lockport & Buffalo Railway, the Empire State Railroad, the Auburn & Syracuse Electric Railroad and the Rochester & Syracuse Railroad. A large express and freight station is operated by the company in its Main-Virginia Street carhouse.

Will Make Local Stops in Lockport.—J. D. Nailor, general manager of the Rochester, Lockport & Buffalo Railway, Rochester, N. Y., has advised Mayor Ernest B. Crosby of Lockport that he has issued orders for the crews of its interurban cars to make all local stops in the city of Lockport to receive and discharge city passengers. The Lockport municipal authorities recently notified the company that its franchise would be revoked if it failed to carry local passengers. Since July 1, when the strike on the local and interurban lines of the International Railway, Buffalo, N. Y., went into effect, employees of the Rochester, Lockport & Buffalo Railway have refused to make local stops in Lockport to carry local passengers. The Rochester line operates over the local tracks of the International in Lockport. The Rochester crews refused to stop in sympathy with the strikers on the International lines.

Personal Mention

John I. Beggs

Friends of the Nestor of the Industry Pay Him Tribute on Seventy-fifth Birthday Anniversary

There is always work for willing hands to do. John I. Beggs discovered this truism when he was seven years old. He is still willing and he is still working. He has been working for sixty-eight years. Just now he is doing his business bit as president of the Milwaukee Electric Railway & Light Company. This is not Mr. Beggs' only business interest, but it is his business hobby. Every day he is on the job actively administering the affairs of this company, one of the most successful public utilities in the United States.

Just a few days ago about 100 friends and associates of Mr. Beggs from all over the United States gathered at his home on Beggs Isle, Oconomowoc, to celebrate the seventy-fifth anniversary of his birthday. It was, indeed, a gala occasion. Among those who attended was a delegation from Mr. Beggs' own company. They presented Mr. Beggs with a sterling silver water pitcher. This he prizes very highly as coming from the men and women among whom he has worked so long, but he prizes no less highly the silver loving cup engraved with the names of the directors of the North American Company and the sterling silver tea set and tray from the officers of the Wisconsin Securities Company, of which Mr. Beggs is a director. Mr. Beggs is also preserving carefully a sheaf of letters and a bundle of telegrams from associates and friends congratulating him.

J. I. BEGGS

The little party to Mr. Beggs was an extraordinary tribute to an extraordinary man. The question that was asked was how Mr. Beggs felt about it. Surely he must, according to the newspapers, have a message for the public. What was it? Well, just this: "Don't worry—work—and stick." The newspaper men who talked with Mr. Beggs went back with this bit of philosophy: "Never fret. Work hard, persevere and have endurance. Hard work, if the work be congenial, has never killed or harmed any person." There is summarized the personal philosophy of the former president of the American Electric Railway Association.

Even among Mr. Beggs' associates and in the industry of which he has so long been a part, it is a mighty long stretch from the kindly banker, railroad man and car builder—for Mr. Beggs is each of these—of the present day to the fatherless lad of seven years working in a brick yard. Yet the man is only the boy grown up. A volume, indeed, several volumes, might be written about the business activities of Mr. Beggs. It is impossible here to do more than note some of the outstanding events in that career. He was born in Philadelphia, Sept. 17, 1847. He organized a company and built the first electric light and street railway system in Harrisburg, Pa., almost forty years ago. He built two great electric power plants for the New York Edison Company in 1887. He built and reorganized electric service plants in other cities. He appeared in Milwaukee in the early '90s as an expert in a famous 3-cent fare controversy between the electric company and the city and later returned to reorganize the properties.

Mr. Beggs was 50 years old when he tackled his big job in Milwaukee. At sixty he was a director of the largest bank in Wisconsin and at sixty-four owner and president of the St. Louis Car Company. At seventy he helped organize and accepted the presidency of the huge new rolling mills located just outside of Milwaukee.

In 1911 Mr. Beggs went to St. Louis, where he had acquired control of the St. Louis Car Company. While still president of this company he returned to Milwaukee in 1919 again to assume the presidency of the Milwaukee Electric Railway & Light Company.

That is the tabloid record. It isn't intended to be complete. The man of active affairs, however, will be quick to appreciate the romance concealed between these lines and also will be quick to realize the burdens which were imposed in managing all these different undertakings. It would seem that there is no one anywhere in the electric railway industry in the United States to whom the title Nestor might more fittingly be applied than to Mr. Beggs.

Thomas Lees Resigns

Thomas Lees, manager of the Lowell district of the Eastern Massachusetts Street Railway, has resigned, effective Sept. 30. Maurice E. McCormick, manager for the past year of the Salem district, will succeed Mr. Lees, who will remain in an advisory capacity until Nov. 1. Mr. Lees was president of the New England Street Railway Club.

"Making the Grade"

Remarkable Record of Achievement Made by W. B. Yereance in Rehabilitating New York Lines

"Making the Grade." This is the title of a department in the New York *Globe* that has attracted great attention. It is devoted to recording extraordinary personal achievement. Fortunate, indeed, is the individual whose attainments are recited therein. Although the term "Making the Grade" has been appropriated from railroad work, few if any railroad men have made the grade—in the sense that the *Globe* uses the expression. The reason is that spectacular success is not very often possible to the railroad man. The two do not go together. The railroad man must remain content with the knowledge of work well done. He may make the grade, but no Boswell is at his elbow to tell the public about it. If any railroad man ever made the grade, that man is W. B. Yereance, whose resignation from the Eighth and Ninth Avenue Railroads was recorded in the *Electric Railway Journal* for Aug. 16.

W. B. YEREANCE

Mr. Yereance as chief engineer and general manager did some extraordinary things with these lines, cast adrift from the rest of the New York Railways system. It was more than a case of bringing order out of chaos. Bringing order out of chaos implies that you have chaos with you as a starting point. It was worse than chaos that Mr. Yereance encountered on taking over these lines. He did have a railroad and a few cars as a foundation, but beyond this there were none of the other ordinary railroad attributes. There was no source of power within the lines themselves and there were no shops and no carhouse facilities. Moreover, there was the 5-cent fare and no hope of escape from that rate. Worse yet, there was no organization with which to work. All this bothered Mr. Yereance, but it didn't dishearten him.

The work upon which Mr. Yereance entered in July, 1919, has been an almost truly creative task. It involved developing an organization, planning the work of each department, co-ordinating the functioning of all and establishing a valuable morale. All this was preliminary to acquiring the necessary facilities, improving the public relations, etc. Of all this work Mr. Yereance was both designer and executive—wisely so, as thereby authority and responsibility were centralized. There have already been published in the *Electric Railway Journal* several articles on the improvements effected in these properties and there will shortly be printed another, on what is probably the largest and most important physical extension and improvement, the new operating terminal at 155th Street, now well along toward completion under present plans.

Mr. Yereance brought to this work a consistent training and wide experience gained in work which ranged in geographical location from Massachusetts to Nebraska and from Illinois to Texas. He was graduated in 1888 as a mechanical engineer from Stevens Institute of Technology and he went directly to the Dickson Locomotive Works as machinist, first in the tool room and later on the erecting floor. His next work was with the New York Central & Hudson River Railroad as inspector of coal and locomotives—Transportation Department. Then for two years he was instructor and acting dean and registrar School of Civil Engineering, New York University, coincidently in private practice with the late Charles B. Brush on municipal utilities. For the next two years he was assistant to the general manager and chief engineer Brooklyn Elevated Railroad.

For the next four years Mr. Yereance was on the staff of the general superintendent of the West Shore Railroad with special way, traffic and transportation duties, principally engineering, loss and damage claims and freight handling and movement from receipt to delivery. He was next promoted to be executive secretary to the vice-president and general manager of the West Shore Railroad, vice-president C., C. C. & St. Louis and other railroads, where his work was mainly transportation, financial and accounting. He continued in these capacities until the New York Central assumed the direct operation of the West Shore. For the next three years he was assistant to the general superintendent of the Brooklyn Heights Railroad (operating organization of the B. R. T. System, both elevated and surface divisions), coincidently secretary of the New York Railroad Club.

Then for seventeen years he was a consulting engineer and operator of public utilities properties, for seven years of which he was employed exclusively in work of this character for two large firms of general practitioners. During this extended period he examined and made reports on steam and electric roads' construction projects, proposed consolidations, extensions and purchases and betterment and extension requirements of existing properties. In addition he was retained to study valuation problems and to pass upon questions of operating efficiency, management, etc. He also gave expert testimony in many important cases.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Extensive Improvements in Union Traction Power Facilities

Extensive changes in the power and transmission equipment of the Union Traction Company of Indiana, Anderson, Ind., are in progress and may be completed within two months. High tension lines are being installed between Muncie and Selma, on the Muncie-Union City division, and between Muncie and Eaton, on the Muncie-Bluffton division. The power plants at Winchester and Eaton are to be shut down and much of the equipment sold. Power to supply the lighting plants situated on these lines will in future be brought from the central power plant at Anderson.

At the Anderson plant two 400 hp. Edgemoor boilers, with Foster superheaters, Diamond soot blowers, Green chain grates and B. & W. water boxes are to be removed and sold, to be replaced with boilers of the same make, but of 600 hp. capacity. The equipment to be sold from the Eaton and Winchester plants consists of two 500-kw. cross compound condensing Buckeye engines, direct connected to Westinghouse a.c. 380 volt 25 cycle generators; two 500 kw. Cooper Corliss cross compound condensing engines, direct connected to Westinghouse 380 volt 25 cycle a.c. generators. The engines are equipped with surface condensers and circulating and vacuum pumps, also generator and exciter switchboard panels. Other miscellaneous equipment to be sold includes four 30 kw., 110 volt d.c. exciters, driven by Buckeye and Ridgeway simple engines, four 250 and three 300 hp. Stirling boilers and appurtenances.

After the changes have been made the generating equipment in the Anderson power plant will consist of five 1000-kw. Rice & Sargent cross compound, condensing engines, direct connected to Westinghouse 380 volt, 3 phase, 25 cycle a.c. generators, two 1500 kw. G. E. high pressure turbines, with 380 volt, 3 phase, 25 cycle generators and one 2500 kw. Westinghouse low pressure turbine and Westinghouse 380 volt, 3 phase, 25 cycle generator.

In the boiler room will be six 600 hp. B. & W. boilers and ten 400 hp. B. & W. boilers; the 600 hp. boilers will be equipped with Taylor underfeed stokers, while the 400 hp. boilers will be equipped as heretofore with chain grate stokers. There are in use two feed water heaters, one a 7,000 hp. Cochrane metering heater, the other a 7,000 hp. open heater.

The water for boiler purposes is treated with an International intermittent system, consisting of two 90,000 gallon tanks and filters with the necessary pumps. There is also a 15,000 gallon elevated water tank for house supply. The boiler feed pumps consist of one 1,500 gal. per min. Mid-West Engine Company's centrifugal pump and turbine, one 500 gal. per min. pump, same make, one cross compound duplex Worthington pump and two 8-in. duplex, single, Blake pumps. These are for fire protection, one 500-gal. and one 750-gal. Worthington fire pumps.

This plant will supply power for the entire Union Traction System after the changes have been made, through twenty-nine converting substations and the transformers in forty towns to which power for industrial and domestic use is supplied.

To supply power to the lines heretofore supplied from Eaton and Winchester will require stepping down the voltage at the Muncie substation from 33,000 volts to 16,000 volts and for this purpose four 400-kva. transformers will be used. Two 25,000-volt oil circuit breakers have also been ordered for installation in these lines for protection, also a full complement of lighting arresters and disconnect switches. The additional load will be taken care of at the Anderson power plant by the installation of four 1,000-kva. water-cooled Westinghouse transformers.

W. S. Rugg Appointed General Sales Manager

W. S. Rugg, assistant to the vice-president, has been appointed general manager of sales of the Westinghouse Electric & Manufacturing Company. The position of general sales manager is a new one in the Westinghouse Electric Company.

Mr. Rugg was born in Broadhead, Wis., and was graduated from Cornell University. He became identified with the Westinghouse company in 1892 and three years later was transferred from Pittsburgh to the Chicago office as district office engineer.

While engaged in this position, Mr. Rugg attracted the attention of the manager of that office, who decided that Mr. Rugg would make an excellent salesman. Quite contrary to the latter's own ideas on the subject, the manager forced Mr. Rugg into selling with results that pleased the manager and very much surprised Mr. Rugg.

In 1901, Mr. Rugg was transferred to the New York Office as special sales engineer and in 1909 was made manager of that office. In 1917, he was transferred to the East Pittsburgh works and made manager of the railway department. Shortly after, he became manager of the Marine Department also. During his administration of the railway department, started when the industry, due to the war, was at its lowest ebb, the most constructive work of the department of any previous period was accomplished.

His success in the railway department resulted in his promotion in 1920 to assistant to Vice-President Shute, in charge of sales. His duties in this position gave him special jurisdiction over negotiations and district office personnel and especially fitted him for the general sales managership.

Car Works Injured by Fire

The wood mill and the cabinet and erecting shop of the Perley A. Thomas Car Works at High Point, N. C., were destroyed by fire on Sept. 19 with a loss of cars and equipment amounting to about $225,000. The company expects to have a new building erected at once and be ready for operation in about sixty days.

Car Building Active

The United States Department of Labor, through the Bureau of Labor Statistics, compiles monthly figures of employment in representative industries. Among these is that of car building and repairing, in which the conditions in seventy-two establishments are canvassed monthly. The figures follow:

Expenditure on payroll in July, 1922, $2,134,427; in August, $2,685,339. This is an increase of $550,912, or 25.8 per cent.

Foreign Trade Handbook Issued

An exceptionally usable foreign commerce handbook has just been issued by the Foreign Commerce Department of the Chamber of Commerce of the United States. Within the space of thirty-one pages this publication condenses a mine of information as to sources of service in foreign trade. Its alphabetical arrangement makes it a handy reference work for the busy exporter or importer. The book contains also a list of the topics of national importance that are engaging the attention of the National Chamber's Foreign Commerce Department Committee under the chairmanship of Willis H. Booth of New York. As the first publication of its kind the handbook meets a distinct need in foreign trade and industrial circles.

Metal, Coal and Material Prices

Metals—New York	Sept. 26, 1922
Copper, electrolytic, cents per lb.	14.00
Copper wire base, cents per lb.	15.625
Lead, cents per lb.	6.375
Zinc, cents per lb.	7.225
Tin, Straits, cents per lb.	32.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$8.075
Somerset mine run, Boston, net tons	4.75
Pittsburgh mine run, Pittsburgh, net tons	4.50
Franklin, Ill., screenings, Chicago, net tons	4.125
Central, Ill., screenings, Chicago, net tons	3.375
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	6.50
Weatherproof wire base, N.Y., cents per lb.	16.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N.Y., cents per gal.	91.50
White lead, (100-lb. keg), N.Y., cents per lb.	12.75
Turpentine, (bbl. lots), N.Y., per gal.	$1.34

Rolling Stock

Jacksonville (Fla.) Traction Company through Manager Ingles has declared that the aim of the company is to equip every line in the city with the new one-man cars.

Louisville (Ky.) Railway has placed a contract with the National Safety Car Equipment Company, St. Louis, for fifty-five one-man type safety cars, which will be built in the plant of the Cincinnati Car Company, deliveries to start shortly. These cars will be of the single-truck type, equipped with General Electric motors of 25 hp., one on each axle, or two to the truck. The control will be General Electric. Westinghouse traction airbrakes are specified. Double doors will be provided at the front, for exit and entrance, along with the pay-as-you-enter fare feature. The company will also rebuild thirty cars in its own shops. These, added to the sixteen now in operation on the Brook Street lines, and fifty-five to be purchased, will give the company 101 safety cars of the one-man type. Five lines are to be equipped with this type of car.

Track and Roadway

Washington Railway & Electric Company, Washington, D. C. has received permission to install single overhead trolley wires in place of double wires on several of its suburban lines.

Jacksonville (Fla.) Traction Company has completed the double tracking from Orange to Eighth Street. The company has spent $75,000 as its share in the straightening of Main Street.

New Orleans Railway & Light Company, New Orleans, La., promises a most radical physical change to the properties in connection with the New Orleans reorganization. The change is that of altering the gage on the St. Charles, Tulane and North Claiborne lines to conform with that on other city routes. For many years local car service has lacked elasticity for the reason that there could not be an exchange of cars between those two track systems, and, of course, no rerouting that involved any such community of trackage. The cost of making the change will run into the hundreds of thousands of dollars but calculations made indicate that the outlay would be returned in due time with a good profit by making the system uniform.

Power Houses, Shops and Buildings

Louisville (Ky.) Railway, through President Barnes, has stated that it was not in a position as yet to give out any information concerning just what would be done in connection with plans for improving the riverside power plant. The company is planning eventually to pass up its old plant on Finzer Street. This will result in a great saving in the item of water alone, as the newer plant is right on the riverfront. The company is erecting an additional smoke stack at the riverside plant now.

Trade Notes

Power Specialty Company, New York, N. Y., announces the appointment of Pell W. Foster, Jr., as New England district manager with offices at 50 Congress St., Boston. Mr. Foster was formerly in the New York sales office of the company.

National Railway Appliance Company, New York, N. Y., has no intention of moving its offices from its present quarters at 452 Lexington Avenue, New York City. The statement appearing in the *Electric Railway Journal*, issue of Sept. 23, to the effect that the company contemplated making a change was due to an error on the part of the editors in which names were confused.

Economy Electric Devices Company, Chicago, Ill., recently received an order through the Westinghouse Electric & Manufacturing Company to supply 120 1,500-volt, 300-amp. Economy meters for locomotives that are being built for the Paris-Orleans-Mediterranean Railway of France. This is thought to be the largest single order for heavy locomotive type watt-hour meters ever placed. The Westinghouse company is to supply the complete control equipment for these locomotives, which are under construction in France. The company has also received an order for 1,442 Economy inspection dial meters completely to equip the United Railways, St. Louis, Mo. This order followed a general investigation of power-saving devices on several Eastern properties, and two tests on its own lines involving seventy-two meters, one to show probable savings and the other to show the effect on maximum demand. In the latter test the reduction in maximum demand in the rush hour was within 1 per cent of the average all-day per cent reduction in energy consumption. The United Railways will equip all cars, not only for energy measurement but also for car inspection.

New Advertising Literature

Wagner Electric Corporation, St. Louis, Mo., has issued a bulletin emphasizing Wagner "Ability."

Climax Engineering Company, Clinton, Ia., has issued an eight-page bulletin No. 1001 with illustrations of some typical installations of climax engines in contractors' machinery.

The Electric Railway Equipment Company, Cincinnati, Ohio, has issued a catalog entitled "Overhead Trolley Materials." It contains a complete listing with illustrations of standard trolley suspension material, trolley wheels, line section switches, etc.

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Go with Rapid Transit and Mass Transportation

With the return of better times, some of those long-postponed rapid transit plans are beginning to be discussed again. And additional cars are being ordered for existing subway systems. Meanwhile, many railway companies are once more considering the purchase of big new cars for handling heavy traffic in rush hours, singly and in multiple-unit trains of two and even three cars.

Where heavy cars are used, the Peacock Improved Brake, 12-52 gear ratio is specified by engineers who appreciate the necessity of having the most powerful hand-brake equipment even on cars with the finest air-brake system that money can buy. Such for instance is the case on the cars of the N. Y. Municipal, shown above.

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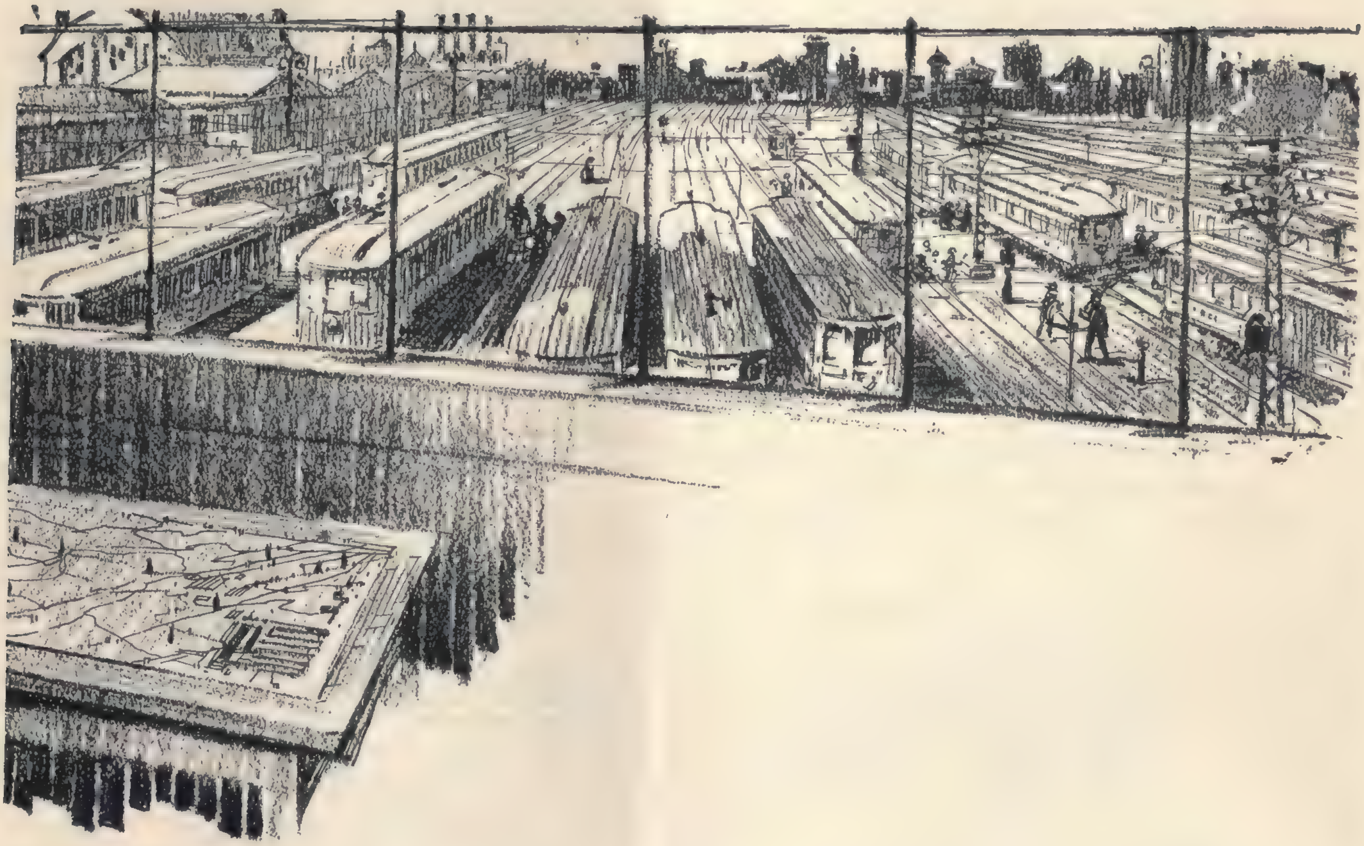

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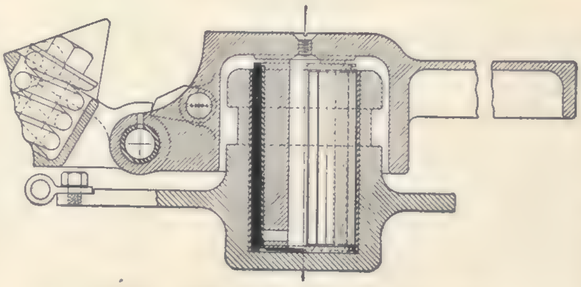

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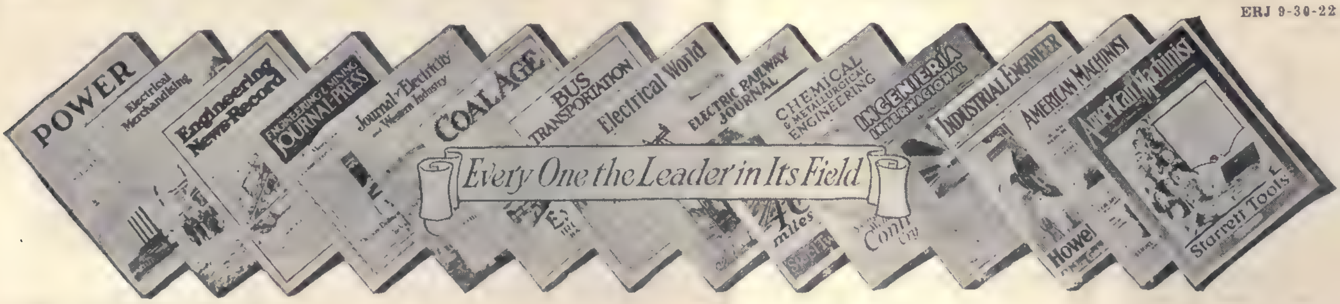

Here it is!

Note the date of this article announcing the P & H Guaranteed Penetration process of butt-treating cedar poles - perfected by Page & Hill Co.

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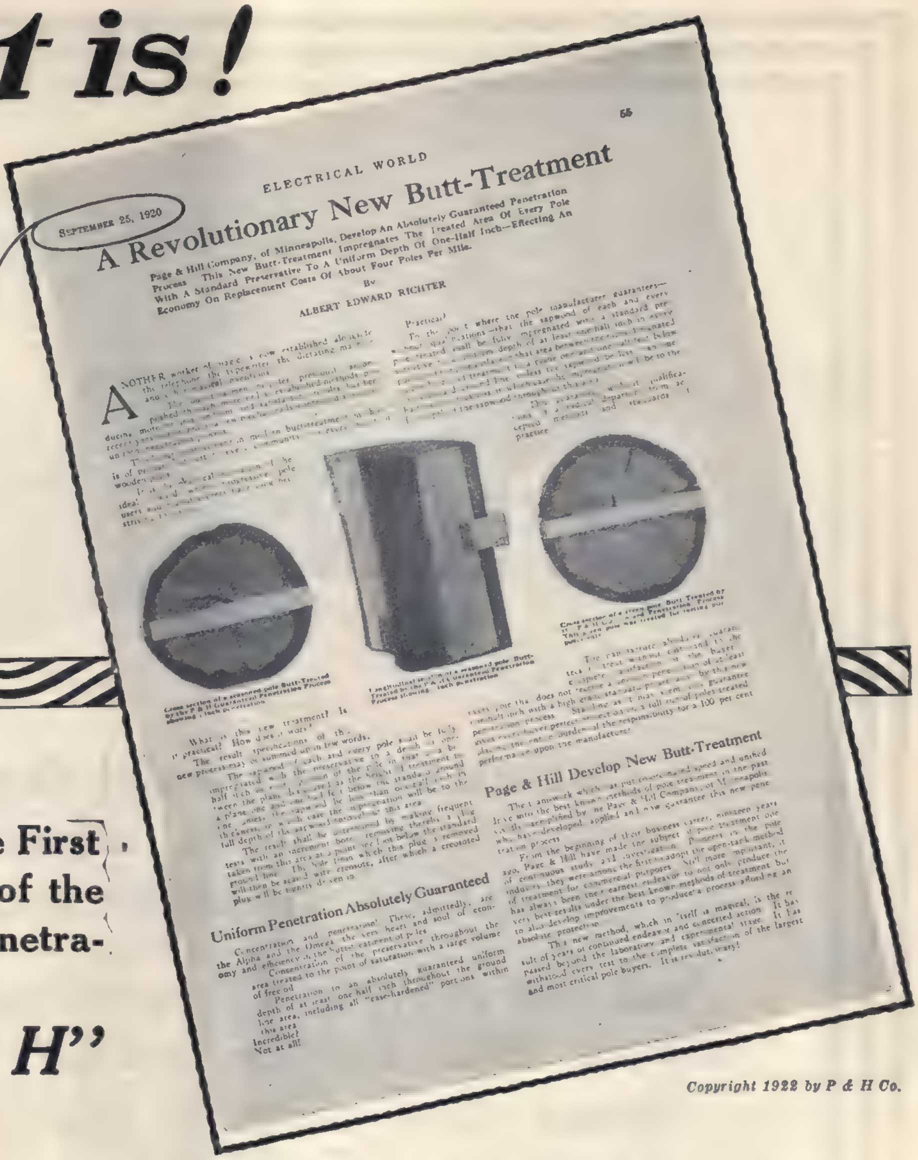

ELECTRICAL WORLD

SEPTEMBER 25, 1920

55

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By

ALBERT EDWARD RICHTER

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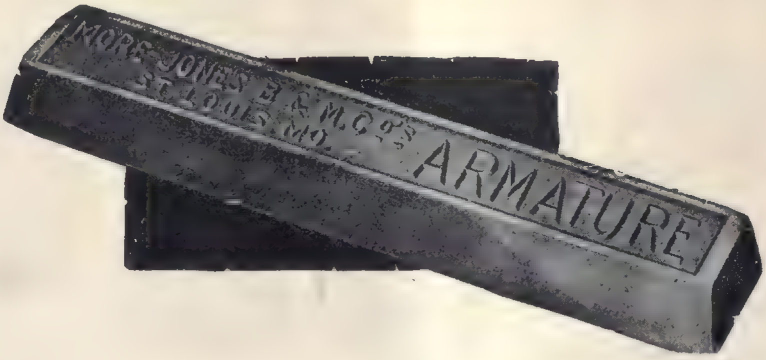

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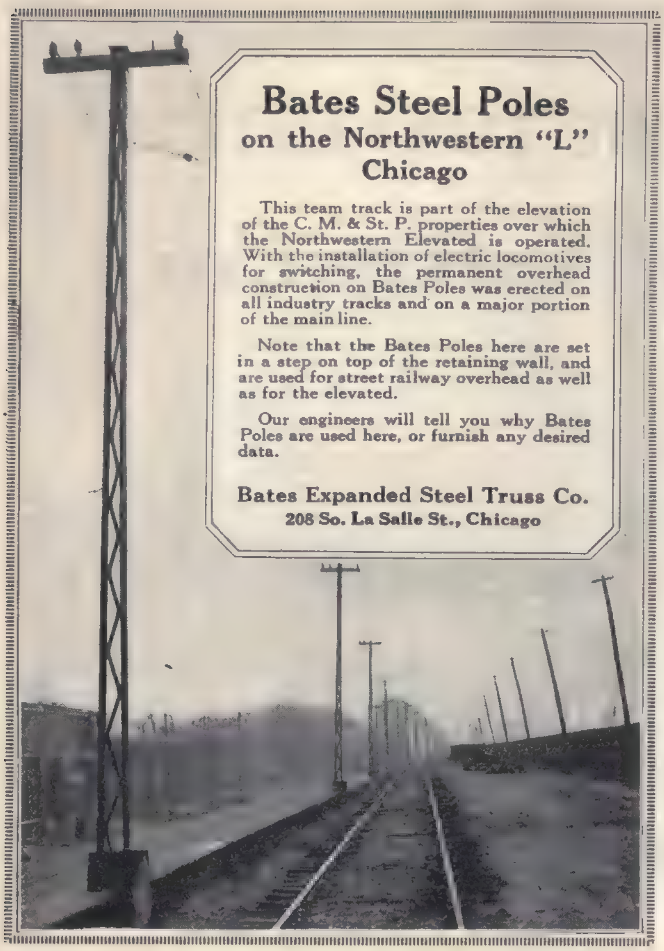

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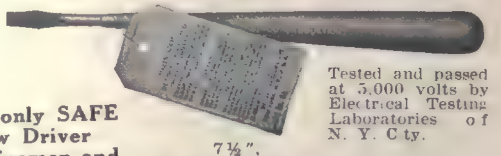

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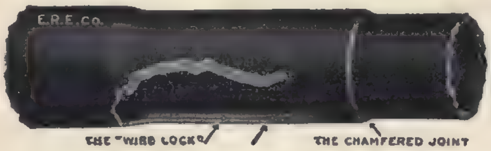

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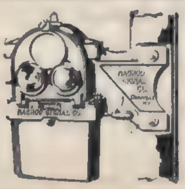
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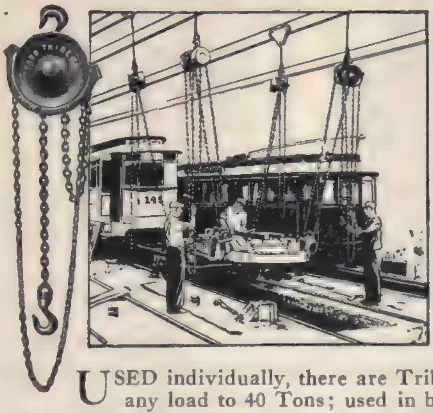

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For 60 years we have been the largest importers of rattan from the Islands in the Indian Ocean. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

SALES OFFICES:
Heywood-Wakefield Co., 516 West 34th St., New York.
Heywood-Wakefield Co., 1415 Michigan Ave., Chicago.
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
Railway and Power Engineering Corp., Toronto and Montreal.
G. F. Cotter Supply Co., Houston, Texas.

PS HEATERS

Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. **Write for details.**

The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

B. A. Hegeman, Jr., President
Charles C. Castle, First Vice-President
Harold A. Hegeman, Vice-Pres. and Treas.
W. C. Lincoln, Mgr. Sales and Engineering
Fred C. J. Dell, Secretary

National Railway Appliance Co.

Grand Central Terminal
452 Lexington Ave., Cor. 45th St., N. Y.

BRANCH OFFICES:
Munsey Bldg., Washington, D. C. 100 Boylston Street, Boston, Mass.
85 Union Trust Bldg., Harrisburg, Pa.
Hegeman-Castle Corporation, Railway Exchange Bldg., Chicago, Ill.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions
Anderson Slack Adjusters
Genesco Paint Oils
Dunham Hopper Door Device
Feasible Drop Brake Staffs
Flaxlinum Insulation
Anglo-American Varnishes, Paints, Enamels, Surfacers, Shop Cleaner.
Johnson Fare Boxes
Peerless and Perry Side Bearings
Drew Line Material and Railway Specialties
Hartman Centering Center Plates
Economy Power Saving Meters
H & W Electric Heaters
Garland Ventilators
Pitt Sanders
National Safety Car Equipment Co.'s One-Man Safety Cars
Central Equipment Company's Hand Holds
Tnemco Paint & Oil Company's Cement Paint

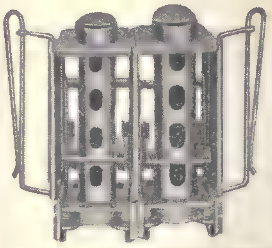
Tickets and Cash Fares.

THE CLEVELAND

accommodates both

The Cleveland Fare Box Co.
CLEVELAND OHIO
Canadian Cleveland Fare Box Co., Ltd., Preston Ontario

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels, to suit his personal requirements and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois

RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings:
also **ELECTRIC THERMOMETER CONTROL**
of Car Temperatures.

141-151 WEST 22D ST.
Chicago, Ill.

Write for Catalogue

1328 Broadway
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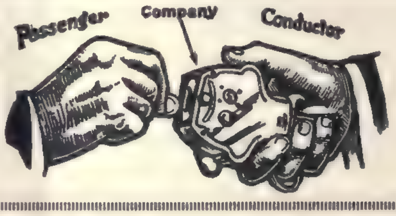
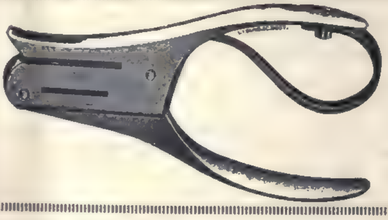


Direct Automatic Registration By the Passengers

Rooke Automatic Register Co.
Providence, R. I.



A Style for Every Service

Send for Catalog

BONNEY-VEHSLAGE TOOL CO.
Newark, N. J.

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

SEARCHLIGHT SECTION

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 5 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 14 inches	4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

WORKING foreman wanted for car barn; eight or ten cars daily operation; General Electric equipment, Westinghouse air; location New York state. Give age, reference, experience and salary expected. P-465, Elec. Ry. Journal.

POSITIONS WANTED

GENERAL manager with successful record, wants job with a company having difficulty in making expenses. Experienced in freight development and successful with labor. PW-462, Elec. Ry. Journal, Leader-News Bldg., Cleveland, O.

WORKING barn foreman desires position. Can do any kind of wiring, wind armatures and controller repairs; 12 years' experience. PW-463, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

FOR SALE

12 New General Electric 203-P

MOTORS

TRANSIT EQUIPMENT CO.
501 Fifth Ave., New York

FOR SALE

2 SNOW SWEEPERS

On McGuire Truck, 50-hp. motors, double end K-35 G. E. Control. Very low price. Immediate delivery.

ELECTRIC EQUIPMENT COMPANY,
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE CHEAP

Exciter Equipment

The nameplate reading as follows:

West. Elec. & Mfg. Co. D.C. Generator, 37.5 kw., E.M.F. 125, Amps. 300, Speed 350, Serial No. 159137, direct connected to Westinghouse Automatic Compound Engine No. 1625, Side 9 x 15 x 9. This set operated with steam pressure of 150 pounds.

On account of our changing our machinery at our Shops we offer this at a bargain.

G. R., G. H. & M. RY. CO.
Mr. S. L. Vaughan,
Vice Pres. and Gen. Mgr.
Grand Rapids, Michigan.

SOME ONE WANTS TO BUY

the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

SELL IT BEFORE DEPRECIATION SCRAPS IT

THE SEARCHLIGHT SECTION IS HELPING OTHERS
—LET IT HELP YOU ALSO

0079

For Sale—Motors

6—G. E. 800.
2—G. E. 1,000.

LAFAYETTE STREET RAILWAY
Lafayette, Ind.

The "Searchlight" Advertising in This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are *you* using the Searchlight Section?

0318

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

- **Advertising, Street Car**
  - Collier, Inc., Barron G.
- **Air Receivers & Aftercoolers**
  - Ingersoll-Rand Co.
- **Anchors, Guy**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Armature Shop Tools**
  - Elec. Service Supplies Co.
- **Axles**
  - Bemis Car Truck Co.
  - Cambria Steel Co.
  - Midvale Steel & Ord. Co.
  - St. Louis Car Co.
  - Standard Steel Works
- **Axles, Car Wheel**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Westinghouse E. & M. Co.
- **Axle Straighteners**
  - Columbia M. W. & M. I. Co.
- **Babbitt Metal**
  - Ajax Metal Co.
  - More-Jones Br. & Metal Co.
- **Babbitting Devices**
  - Columbia M. W. & M. I. Co.
- **Badges and Buttons**
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
- **Bearings and Bearing Metals**
  - Ajax Metal Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Gilbert & Sons, B. F. A.
  - More-Jones Br. & Metal Co.
  - St. Louis Car Co.
  - Westinghouse E. & M. Co.
- **Bearings, Center and Roller Side**
  - Stucki Co., A.
- **Bearings, Roller**
  - Stafford Roller Bearing Car Truck Corp'n.
- **Bells and Gongs**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Consolidated Car-Heating Co.
  - Electric Service Sup. Co.
  - St. Louis Car Co.
- **Benders, Rail**
  - Railway Track-work Co.
- **Boilers**
  - Babcock & Wilcox Co.
- **Boiler Tubes**
  - Cambria Steel Co.
  - Midvale Steel & Ordnance Co.
- **Bonding Apparatus**
  - American Steel & Wire Co.
  - Electric Railway Improvement Co.
  - Electric Service Sup. Co.
  - Indianapolis Switch & Frog Co.
  - Ohio Brass Co.
  - Rail Welding & Bonding Co.
  - Railway Track-work Co.
- **Bonds, Rail**
  - American Steel & Wire Co.
  - Electric Railway Improvement Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Indianapolis Switch & Frog Co.
  - Ohio Brass Co.
  - Rail Welding & Bonding Co.
  - Westinghouse E. & M. Co.
- **Book Publishers**
  - McGraw-Hill Book Co., Inc.
- **Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)**
  - Bates Exp. Steel & Tr. Co.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - Hubbard & Co.
  - Ohio Brass Co.
- **Brake Adjusters**
  - National Ry. Appliance Co.
  - Westinghouse Tr. Br. Co.
- **Brake Shoes**
  - Amer. Br. Shoe & Fdry. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - St. Louis Car Co.
- **Brakes, Brake Systems and Brake Parts**
  - Allis-Chalmers Mfg. Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Johns-Manville, Inc.
  - National Brake Co.
  - Safety Car Devices Co.
  - Westinghouse Tr. Br. Co.
- **Brooms, Track, Steel or Rattan**
  - Amer. Rattan & Reed Mfg. Co.
- **Brushes, Carbon**
  - General Electric Co.
  - Jeandron W. J.
  - Le Carbone Co.
  - Westinghouse E. & M. Co.
- **Brushes, Wire Pneumatic**
  - Ingersoll-Rand Co.
- **Brush Holders**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
- **Buses, Motor**
  - Brill Co., The J. G.
  - Mitten-Traylor Incorporated
- **Bushings**
  - Nat'l Fibre & Insulation Co.
- **Bushings, Case Hardened and Manganese**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
- **Cables (See Wires and Cables)**
- **Cambric, Tapes, Yellow & Black Varnished**
  - Irvington Varnish & Ins. Co.
- **Carbon Brushes (See Brushes Carbon)**
- **Car Lighting Fixtures**
  - Elec. Service Supplies
- **Car Panel Safety Switches**
  - Consolidated Car-Heating Co.
  - Westinghouse E. & M. Co.
- **Cars, Dump**
  - Differential Steel Car Co.
- **Cars, Passenger, Freight Express, Etc.**
  - Amer. Car Co.
  - Brill Co., The J. G.
  - Cambria Steel Co.
  - Kuhlman Car Co., G. C.
  - McGuire Cummings Mfg. Co.
  - Midvale Steel & Ordnance Co.
  - National Ry. Appliance Co.
  - St. Louis Car Co.
  - Wason Mfg. Co.
- **Cars, Second Hand**
  - Electric Equipment Co.
- **Cars, Self-Propelled**
  - General Electric Co.
- **Castings, Brass, Composition or Copper**
  - Ajax Metal Co.
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
  - More-Jones Br. & Metal Co.
- **Castings, Gray Iron and Steel**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - St. Louis Car Co.
- **Castings, Malleable and Brass**
  - Amer. Brake Shoe & Fdry. Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - St. Louis Car Co.
- **Catchers and Retrievers, Trolley**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
  - Wood Co., Chas. N.
- **Catenary Construction**
  - Archbold-Brady Co.
- **Circuit Breakers**
  - Cutter Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Clamps and Connectors for Wires and Cables**
  - Anderson Mfg. Co. A. & J. M.
  - Electric Ry. Equip. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Hubbard & Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)**
  - Brill Co., The J. G.
  - Ohio Brass Co.
- **Clusters and Sockets**
  - General Elcetric Co.
- **Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- **Coil Banding and Winding Machines**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
- **Coils, Armature and Field**
  - Columbia M. W. & M. I. Co.
  - Economy Elec. Devices Co.
  - General Electric Co.
- **Coils, Choke and Kicking**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Coin-Counting Machines**
  - Electic Service Sup. Co.
  - Internat'l Register Co., The
  - Johnson Fare Box Co.
- **Commutator Slotters**
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Commutator Truing Devices**
  - General Electric Co.
- **Commutators or Parts**
  - Cameron Elec'l Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Compressors, Air**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersol-Rand Co.
  - Westinghouse Tr. Br. Co.
- **Compressors, Air, Portable**
  - Ingersoll-Rand Co.
- **Concrete Reinforcing Bars**
  - Cambria Steel Co.
  - Midvale Steel & Ordnance Co.
- **Condensers**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Condensor Papers**
  - Irvington Varnish & Ins. Co.
- **Connectors Solderless**
  - Westinghouse E. & M. Co.
- **Connectors, Trailer Car**
  - Consolidated Car-Heating Co.
  - Electric Service Sup. Co.
- **Controllers or Parts**
  - Allis-Chalmers Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Controller Regulators**
  - Electric Service Sup. Co.
- **Controlling Systems**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Converters, Rotary**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Conveying and Hoisting Machinery**
  - Columbia M. W. & M. I. Co.
- **Copper Wire**
  - Anaconda Copper Min. Co.
- **Cord Adjusters**
  - Nat'l Fibre & Insulation Co.
- **Cord, Bell, Trolley Register, etc.**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Internat'l Register Co., The
  - Roebling's Sons Co., J. A.
  - Samson Cordage Works
- **Cord Connectors and Couplers**
  - Electric Service Sup. Co.
  - Samson Cordage Works
  - Wood Co., Chas. N.
- **Couplers, Car**
  - Brill Co., The J. G.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Cranes**
  - Allis-Chalmers Mfg. Co.
- **Cross Arms (See Brackets)**
- **Crossing Foundations**
  - Internationa Steel Tie Co.
- **Crossing Manganese**
  - Indianapolis Switch & Frog Co.
- **Crossing Signals (See Signals, Crossing)**
- **Crossings, Frog & Switch**
  - Wharton, Jr., & Co., Wm.
- **Crossings Track (See Track, Special Work)**
- **Crushers, Rock**
  - Allis-Chalmers Mfg. Co.
- **Culverts**
  - Canton Culvert & Silo Co.
- **Curtains and Curtain Fixtures**
  - Brill Co., The J. G.
  - Electric Service Sup. Co.
  - Morton Mfg. Co.
  - St. Louis Car Co.
- **Cutouts**
  - Johns-Manville, Inc.
- **Dealers' Machinery**
  - Electric Equipment Co.
- **Derailing Devices (See Track Work)**
- **Destination Signs**
  - Columbia M. W. & M. I. Co.
  - Eectric Service Sup. Co.
- **Detective Service**
  - Wish Service, P. Edward
- **Dogs, Lathe**
  - Williams & Co., J. H.
- **Door Operating Devices**
  - Con. Car-Heating Co.
  - Nat'l Pneumatic Co., Inc.
  - Safety Car Co.
- **Doors and Door Fixtures**
  - Brill Co., The J. G.
  - General Electric Co.
- **Doors, Folding Vestibule**
  - Nat'l Pneumatic Co., Inc.
- **Draft Rigging (See Couplers)**
- **Drills, Rock**
  - Ingersoll-Rand Co.
- **Drills, Track**
  - American Steel & Wire Co
  - Electric Service Sup. Co.
  - Ingersoll-Rand Co.
  - Ohio Brass Co.
- **Dryers, Sand**
  - Electric Service Sup. Co.
- **Electrical Wires and Cables**
  - Amer. Electrical Works
  - American Steel & Wire Co
  - Roebling's Sons Co., J. A.
- **Electric Grinders**
  - Railway Track-Work Co.
- **Electrodes, Carbon**
  - Indianapolis Switch & Frog Co.
  - Railway Track-Work Co.
- **Electrodes, Steel**
  - Indianapolis Switch & Frog Co.
  - Railway Track-Work Co.
- **Engineers, Consulting, Contracting and Operating**
  - Allison & Co., J. R.
  - Archbold-Brady Co.
  - Arnold Co., The
  - Beeler, John
  - Crosett Co., Jas. H.
  - Day & Zimmermann
  - Feustel, Robert M.
  - Ford, Bacon & Davis
  - Hemphill & Wells
  - Holst, Englehardt W.
  - Jackson, Walter
  - Parsons, Klapp, Brinkerhoff & Douglas
  - Richey, Albert S.
  - Robinson & Co., Inc., Dwight P.
  - Sanderson & Porter
  - Smith & Co. C. E.
  - Stone & Webster
  - White Engeneering Corp., The J. G.
  - Witt, Peter
- **Engines, Gas, Oil or Steam**
  - Allis-Chalmers Mfg. Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Fare Boxes**
  - Cleveland Fare Box Co.
  - Economy Electric Devices Co.
  - Johnson Fare Box Co.
  - National Ry. Appliance Co.
- **Fence**
  - Cambria Steel Co.
  - Midvale Steel & Ordnance Co.
- **Fences, Woven Wire and Fence Posts**
  - American Steel & Wire Co.
- **Fenders and Wheel Guards**
  - Brill Co., The J. G.
  - Cleveland Fare Box Co.
  - Consolidated Car Fender Co.
  - Electric Service Sup. Co.
- **Fibre and Fibre Tubing**
  - Johns-Manville, Inc.
  - Nat'l Fibre & Insulation Co.
  - Westinghouse E. & M. Co.
- **Field Coils (See Coils)**
- **Fire Extinguishers**
  - Johns-Manville, Inc.
- **First Aid Kits**
  - First Aid Specialty Co., Inc.
- **Flooring Composition**
  - Amer. Mason Safety Tread Co.
  - Johns-Manville, Inc.
- **Floor Plates**
  - Amer. Abrasive Metals Co.
- **Forgings**
  - Cambria Steel Co.
  - Columbia M. W. & M. I. Co.
  - Midvale Steel & Ord. Co.
  - Williams & Co., J. H.
- **Frogs, Track (See Track Work)**
  - Wharton, Jr., & Co., Wm.
- **Fuses and Fuse Boxes**
  - Columbia M. W. & M. I. Co.
  - Consolidated Car-Heating Co.
  - General Electric Co.
  - Johns-Manville, Inc.
  - Westinghouse E. & M. Co.
  - Williams & Co., J. H.
- **Fuses, Refillable**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
- **Gages, Oil and Water**
  - Ohio Brass Co.
- **Gaskets**
  - Johns-Manville, Inc.
  - Power Specialty Co.
  - Westinghouse Tr. Br. Co.
- **Gas-Electric Cars**
  - General Electric Co.
- **Gas Producers**
  - Westinghouse E. & M. Co.
- **Gasoline Torches**
  - Economy Electric Devices Co.
- **Gates, Car**
  - Brill Co., The J. G.
- **Gear Blanks**
  - Cambria Steel Co.
  - Midvale Steel & Ordnance Co.
- **Gear Cases**
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - Westinghouse E. & M. Co.
- **Gears and Pinions**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - National Ry. Appliance Co.
  - Nuttall Co., R. D.
  - Tool Steel Gear & Pinion Co.
- **Generating Sets, Gas-Electric**
  - General Electric Co.
- **Generators**
  - Allis-Chalmers Mfg. Co.
  - Westinghouse E. & M. Co.
- **Goggles, Eyes**
  - Indianapolis Switch & Frog Co
  - Smith Heater Co., Peter
- **Gongs (See Bells and Gongs)**
- **Greases (See Lubricants)**
- **Grinders and Grinding Supplies**
  - Indianapolis Switch & Frog Co.
  - Railway Track-work Co.
- **Grinders, Portable**
  - Railway Track-Work Co.
- **Grinders, Portable Electric**
  - Railway Track Work Co.
- **Grinding Blocks and Wheels**
  - Railawy Track-work Co.
- **Guards, Trolley**
  - Electric Service Sup. Co.
  - Ohio Brass Co.
- **Hammers, Pneumatic**
  - Ingersoll-Rand Co.
- **Harps, Trolley**
  - Anderson Mfg. Co., A. & J. M.
  - Electric Service Sup. Co.
  - More-Jones Br. & Metal Co.
  - Nuttall Co., R. D.
  - Star Brass Works
- **Headlights**
  - Electric Service Sup. Co.
  - General Electric Co.
  - Ohio Brass Co.
  - St. Louis Car Co.
- **Headlining**
  - Pantasote Co., The
- **Heaters, Car (Electric)**
  - Consolidated Car Heating Co.
  - Economy Electric Devices Co.
  - Gold Car Heating & Lighting Co.
  - National Ry. Appliance Co.
  - Smith Meater Co. Peter
- **Heaters, Car, Hot Air and Water**
  - Smith Heater Co. Peter
- **Heaters, Car (Stove)**
  - Electric Service Sup. Co.
  - Sterling Varnish Co.
  - Westinghouse E. & M. Co.
- **Helmets, Welding**
  - Indianapolis Switch & Frog Co.
- **Hoists and Lifts**
  - Columbia M. W. & M. I. Co.
  - Ford-Chain Block Co.
  - Ingersoll-Rand Co.
- **Hose, Bridges**
  - Ohio Brass Co.
- **Hydraulic Machcinery**
  - Allis-Chalmers Mfg. Co.
- **Instruments, Measuring and Recording**
  - Economy Electric Devices Co.
  - Electric Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Insulating Cloth, Paper and Tape**
  - General Electric Co.
  - Irvingtotn Varnish & Ins. Co.
  - Johns-Manville, Inc.
  - Nat'l Fibre & Insulation Co.
  - Standard Underground Cable
  - Westinghouse E. & M. Co.
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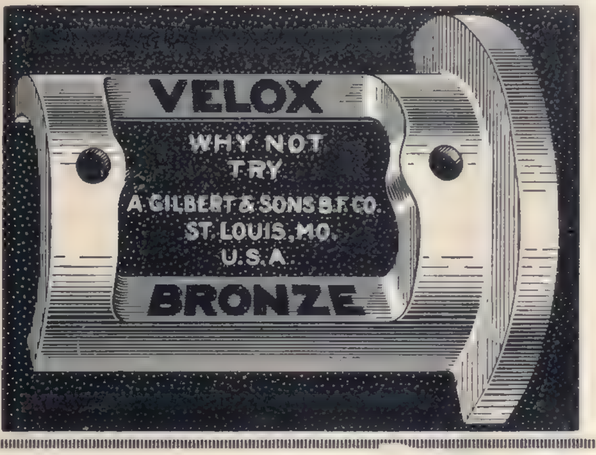
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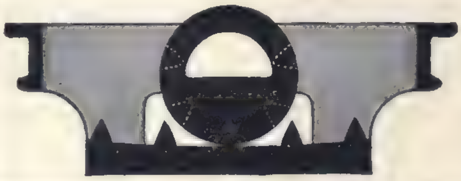

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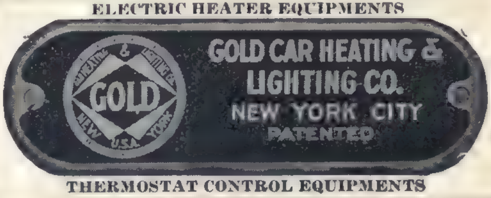

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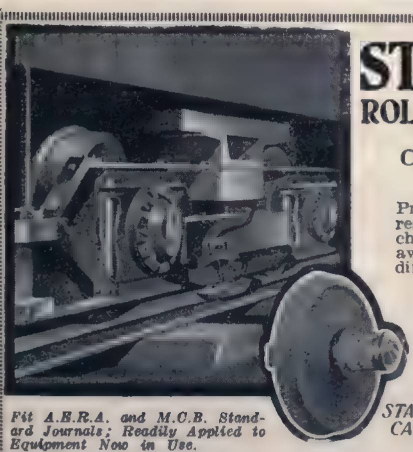

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FERALUN Anti-Slip Treads
Car Steps
Floor Plates
Station Stairs
Door Saddles, etc.
AMERICAN ABRASIVE METALS CO.
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It's iron and emery cast together

Any width, with or without nosing
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for car and station steps
Standard for 15 years
Stanwood Steps and Karbolith Flooring
American Mason Safety Tread Co., Lowell, Mass.
Branch offices in New York and Philadelphia
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SEE OUR CATALOGUE IN SWEET'S

55 New Users in the Last 4 Months
KASS SAFETY TREADS
present an Unusual Combination
in that they give BETTER RESULTS AT LESS COST
Manufactured and Sold by
Morton Manufacturing Company, Chicago

"Boyerized" Products Reduce Maintenance
Bemis Trucks
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Case Hardened Bushings
Case Hardened Nuts and Bolts
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Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.
BEMIS CAR TRUCK CO., Springfield, Mass.

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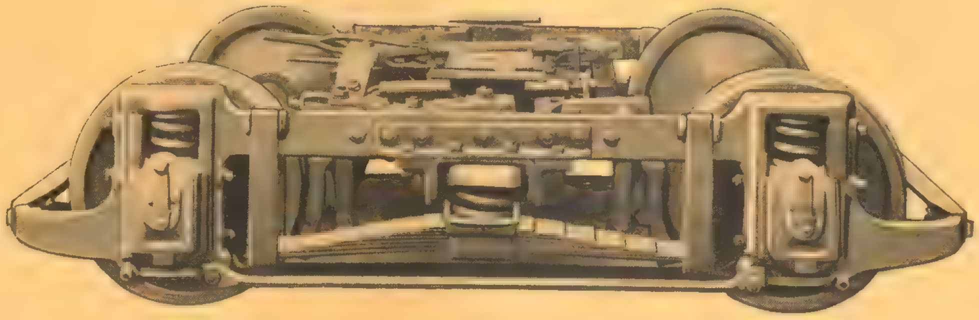
Consolidated Steel Corporation, 25 Broadway, New York, is the sole exporter of our commercial products.



Brill Light-Weight Car Truck

Low Level No. 77-E1

This truck is particularly adapted for light-weight car service where a moderately high rate of speed is maintained. It is of the same general construction as the standard 77-E1 truck, including solid-forged sideframes, with their superior strength, and such comportable-riding producing features as the Brill Bolster Guide and Graduated Spring System.

In addition to the use of small diameter wheels, further reduction in the step height is obtained by extending the transoms underneath the sideframes and lowering the car body height.

Eastern Massachusetts Street Railway Light-Weight Car.
Weight complete, 31,850 lb.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — ST. LOUIS MO. — G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

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Unlimited-Ride Transferable Weekly Pass

is now in use on more than a score electric railways including Racine, Terre Haute, Fort Wayne, Beaver Valley, Youngstown, Tacoma and Chicago (Elevated Railways).

The pass is not a patent medicine. It is but one of many means to make the purchase of a ride more agreeable; to give a wholesale rate for wholesale use; and to maintain the primacy of responsible *systems*—not irresponsible *individuals*— as common carriers.

To get the best results from a pass installation you need the cumulative experience of all preceding users. Do not make a false start which may cost thousands of dollars when a nominal fee will bring to you a painstaking analysis of your specific problem.

"More Revenue from More Riders"

Communicate with

Walter Jackson
Fare and Bus Consultant
143 Crary Avenue, Mount Vernon, N. Y.

McGraw-Hill Co., Inc. October 7, 1922 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

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Trolley Shoes
are noiseless

Amongst other particular advantages, Miller Trolley Shoes are extremely quiet in operation. That disagreeable hum and vibration of the ordinary trolley wheel is conspicuously absent. Conversation and comfort is enjoyed by passengers on fast interurban cars equipped with Miller Trolley Shoes.

A comparative trial is suggested. Put a Shoe on one pole and a wheel on the other and try your car out first with one and then the other.

Send for Shoe to test

MILLER TROLLEY SHOE COMPANY
BOSTON-21, MASS.

MILLER
Trolley Shoes
(Patented)

—meet every requirement for increased efficiency.

1. The Pantagraph applied to the trolley car.
2. Better current collector.
3. Fewer dewirements.
4. NOISELESS.
5. No lubrication.
6. Less wear on trolley wire.
7. More miles per dollar.

Back From The Convention

"Well, Boss," said Joe, "the 1922 convention was a humdinger, and the exhibits were even better than I looked forward to. The Westinghouse crowd sure made good. I spent most of my time in their section. That No. 510 motor you asked me to examine particularly, is just what we want for our new lightweight, double-truck cars, we'll make no mistake in specifying it. They also had on exhibit their Cabinet HL Control, it's a dandy, and I heard the Cincinnati Traction Company are installing 75 quadruple equipments.

"I have made careful notes of other Westinghouse apparatus I saw, and will give you a full report."

"That's fine, Joe," said the Vice President, "Don't be afraid of making your report too long. There are always many worth-while things in the Westinghouse Exhibit to report."

MEMBER ELECTRIC RAILWAY ASSOCIATION AERA 1922

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

W WESTINGHOUSE ELECTRIC

Westinghouse

Vol. 60, *No.* 15 New York, October 7, 1922 *Pages* 535-622

ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE, Editor

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The Editor's Part at the Convention

EVERYBODY at the convention in Chicago saw our editors busy at the booth all day or in attendance at the sessions recording the transactions, or in the evening after seven acting as social butterflies. Theirs was a big job. But back in New York and at the printing plant in Chicago were other editors who worked all night receiving messages by wire and making up the daily issue. Theirs was the real romance of the job of putting to press the convention report as contained in this issue and in the daily before the railway industry.

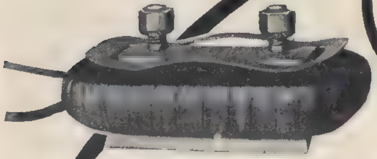
Here is the story of reporting a convention uncolored and without frills. To the casual reader it may seem as lifeless as a corpse, for it may be true that the contents of the daily and the convention report issue are lacking in romance as judged by daily newspaper standards. But to the railway man there is interest and adventure in every page. These issues place before men engaged in the industry the full account of the happenings in Chicago, and in that respect they represent a standard in journalism that ranks the work with the best in news reporting that the daily papers have to offer. To the railway men the convention is the big news feature of the year, for the deliberations may affect any one of them vitally. He may find, on one of the pages, the solution of some problem that confronts him. In any event, the *Electric Railway Journal* has spared neither labor nor expense in putting the deliberations of the convention promptly before the industry in permanent form.

Circulation of this Issue, 5,900 **Advertising Index—Alphabetical, 132; Classified, 128, 130; Searchlight Section, 125-127**

A Severe Winter Is Predicted

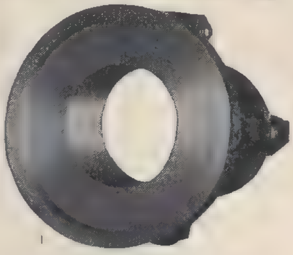
Be prepared with an ample stock of Westinghouse Renewal Parts

Armature Coil

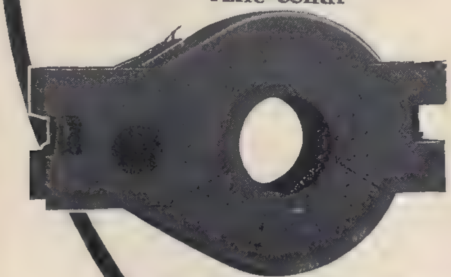


Main Field Coil and Pole

Commutator Coil and Pole



Axle Collar



Pressed Steel Gear Case

Complete Armature with Fan

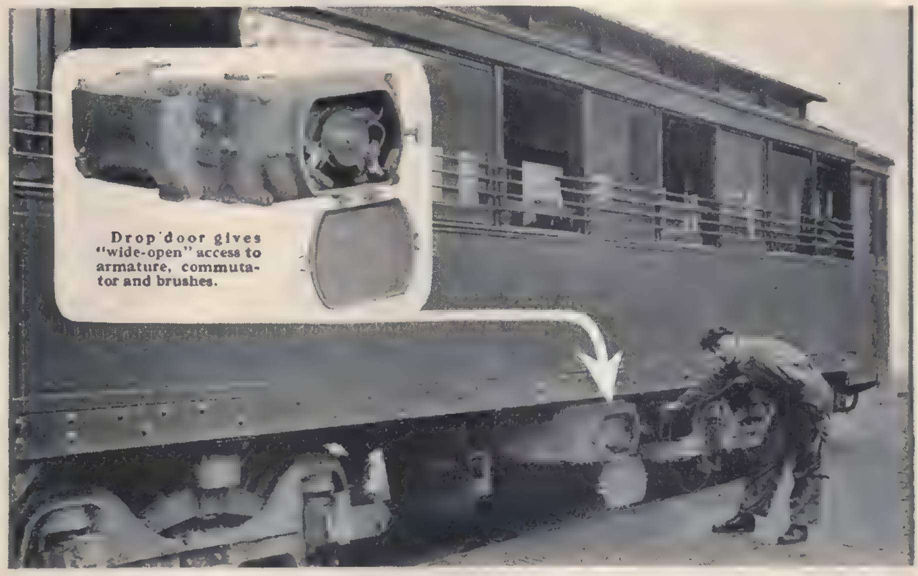
WESTINGHOUSE ELECTRIC

The small investment in a stock of Westinghouse Renewal Parts is insignificant when compared with the loss caused by holding cars out of service awaiting repairs.

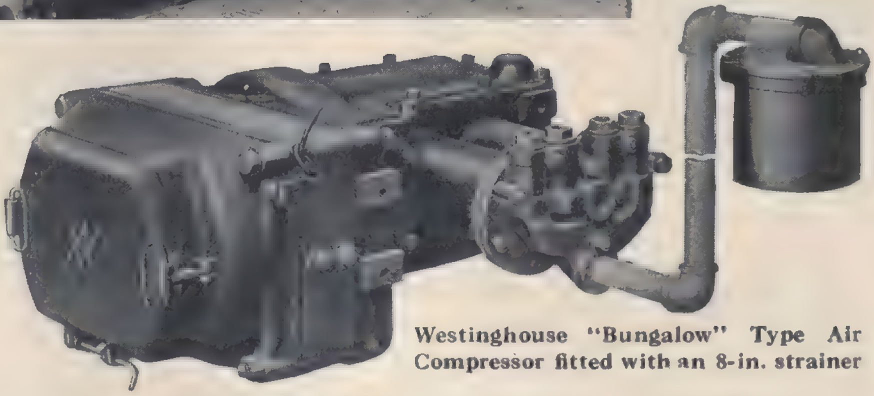
With a good stock of Westinghouse Renewal Parts in your storeroom you assure quick repairs to your cars and their return to service with the least delay.

To maintain Westinghouse equipment in first-class condition, Westinghouse Renewal Parts are necessary. These parts are exact duplicates of those used in the construction of Westinghouse equipment as a whole. The superiority of such renewal parts is manifest.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.


Drop door gives "wide-open" access to armature, commutator and brushes.

DH Type Compressors



Westinghouse "Bungalow" Type Air Compressor fitted with an 8-in. strainer

Famous for the Service They Give

WESTINGHOUSE DH type "Bungalow" Air Compressors were developed to meet special present-day conditions of street railway operation. How well they have succeeded is best told by the many thousands now in service.

DH Compressors are generally preferred for the modern low-built car on account of their compact design. In construction they combine simplicity with ruggedness and durability, and embody a number of distinctive mechanical features, including a system of positive lubrication.

They provide a dependable air supply, sufficient in volume to meet the demand for constant brake manipulation in congested districts, as well as the operation of auxiliary pneumatic devices.

There is a DH Compressor for every class of service: DH-10 for very light cars, DH-16 for light and medium-weight cars, and the DH-25 for heavy cars, operated singly or with trailers.

Westinghouse Traction Brake Company
General Offices and Works: Wilmerding, Pa.

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TRADE MARK

WESTINGHOUSE TRACTION BRAKES

Insurance plus Marsh & McLennan Service

Have You Finished the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

MARSH & McLENNAN

175 W. Jackson Blvd. Chicago, Ill.

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Columbus

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Cleveland

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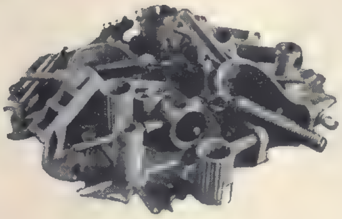
Here are some of the reasons why
O-B TROLLEY BASE
should be on your cars.

New Base for a few cents

All points of principal wear have renewable bushings—shown dark on the photograph. A few cents and a few minutes puts an O-B Base which has seen strenuous service back in perfect condition.

Buffer Spring Absorbs Shocks

If the pole leaves the wire and jumps wild, this sturdy buffer spring on the O-B Base absorbs the shock. It reduces strain on the pole, the base and the car roof.



Interchangeable Parts

You can take five or five hundred O-B Bases, tear them down, mix the parts and put them all together again without a hitch. Repair parts fit—chipping, filing or grinding are never necessary.

Accessible

One man can lift the O-B Base off its stem casting and expose every vital part for inspection and lubrication. Because it is that easy, O-B Base is sure to get whatever attention it needs.

Changing Poles

There is a hook on the O-B Base which locks it, if desired, with the pole in a horizontal position. Poles can be changed in the barn even if headroom is limited.

Twenty Caged Roller Bearings

With the wear divided between twenty rollers, the O-B Base pivots freely—holds wheel to trolley even when track or wire is crooked. Notice that the rollers stand by themselves.

O-B Form 1 Base (Patented)

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

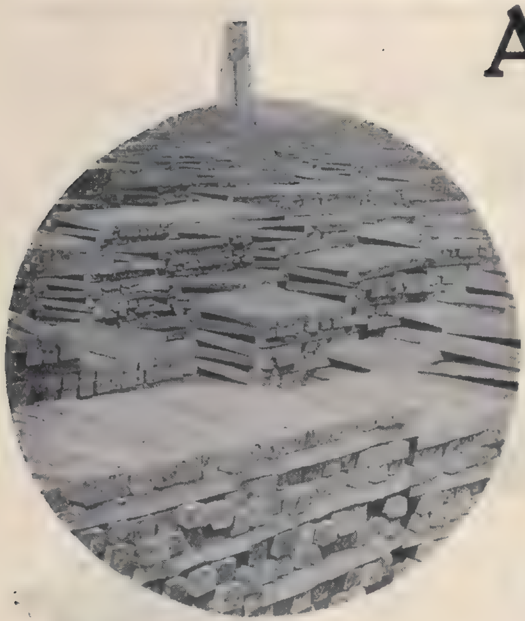
The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

A Cordial Invitation



The Tie that lasts longest is least expensive

WHATEVER may be claimed by a manufacturer for his product, it is the definite knowledge of its worth to the user which fixes its standing. He establishes confidence only as his organization serves—his success depends on how his product endures.

Here are the facts. Thirty-four years of accumulative experience in timber and timber treatment, together with twenty years in direct contact with more than 10,000 small producers in the largest producing area in the country—120 acres of excellently drained yards for seasoning ties, a reliable corps of inspectors, expert supervision of treatment and efficient plant facilities to treat 300,000 ties per month stand behind International Products.

Convincing as our records are of our ability to serve and of the ultimate economy of International Service, the careful buyer is justified in wanting first-hand knowledge of its superiority. *How, where* and *why* International Products are superior is what he desires to know. With this thought in mind, we extend a cordial invitation to visit our plant at Texarkana. It is here that you will see how our methods of selection, grading and treatment bear out the commanding purpose of our organization to *produce sound quality ties in strict adherence to grades.*

International Creosoting and Construction Co.

General Office—Galveston, Tex.

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

A Big Year in Track Construction

is a big year for

STEEL TWIN TIES

MORE paved track is being laid this year than for the past five and, naturally, 1922 is a big year for STEEL TWIN TIES.

From San Diego, California, to Boston, Massachusetts, the initial economy and proven dependable performance of Steel and Concrete for track foundations have decided more and more companies for Steel Twin Tie Track.

Lower material and labor costs say "Rebuild paved track *now!*" But select the type of paved construction with the lowest cost per foot, per year.

For comparative records in your consideration of this question write today for our complete data folder. It presents details of the twelve-year record of Steel Twin Tie Track and includes an estimate of the cost of Steel Tie construction on your lines.

When checking over your convention program add this note—see the Steel Tie exhibit, booths 113 and 114, Sec. D, Municipal Pier.

The International
Steel Tie Company
Cleveland, O.

Steel Twin Tie Track

Keystone Car

Refinement

Those who saw and examined the Keystone Specialties exhibited at Chicago and those who are using Keystone Specialties will not have to be reminded of the refinement which characterizes each and every one of the products bearing the Keystone mark of perfection. It is an unescapable truth that no piece of equipment can render the service for which it is intended unless particular attention is given to the various refinements entering into the process of manufacture and the choosing of raw materials.

An examination of Keystone Specialties discloses the care and attention given to these important refinements.

If you take pride in the appearance of your cars and in the matter of conveniences they offer the people who buy your service, then you will find Keystone Car Specialties an asset of rare value.

Write for the various data sheets illustrating and describing the Keystone Car Specialties enumerated on the opposite page.

ELECTRIC SERVICE SUPPLIES CO
MANUFACTURER OF RAILWAY MATERIAL AND ELECTRICAL SUPPLIES

ELECTRIC SERVICE SUPPLIES C

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
337 Oliver Building

SCRANTON
316 N. Washington Ave.

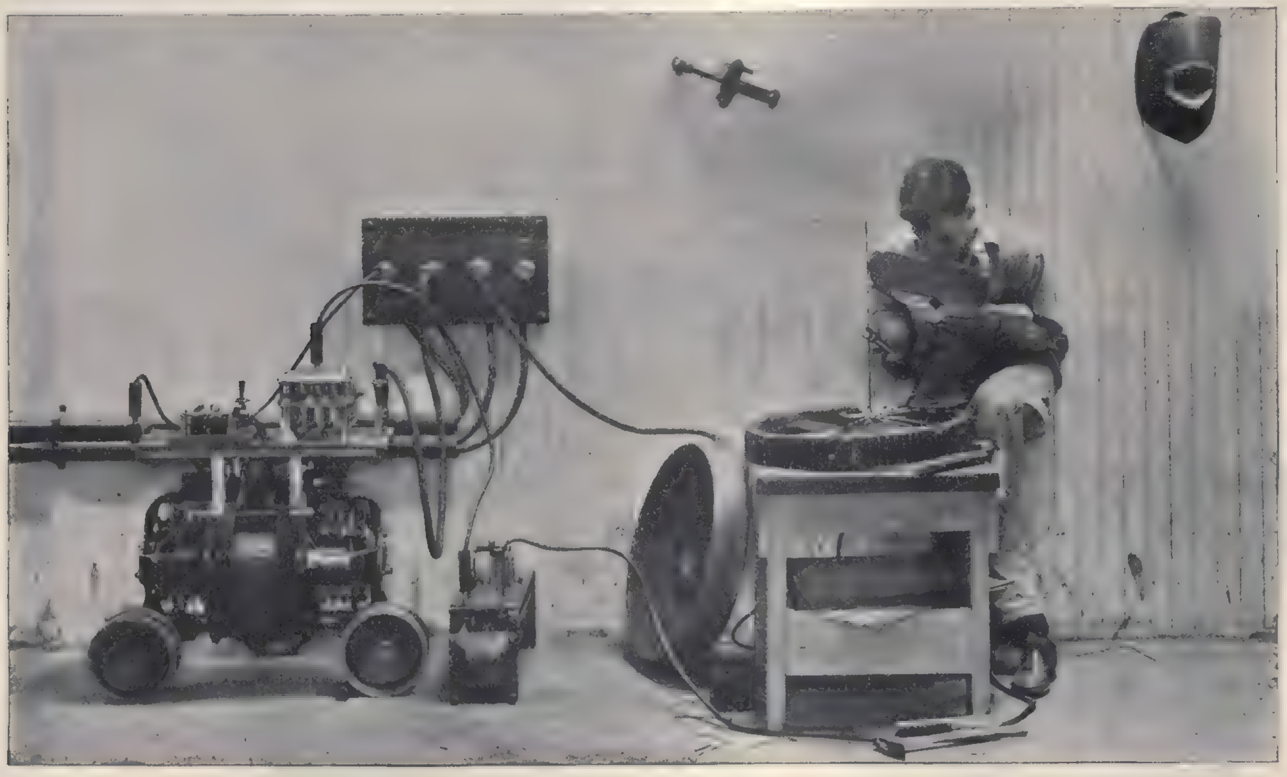
NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Specialties

Check off the items you need and write for data sheets

- ☐ Keystone Air Sanders
- ☐ Keystone Air Valves
- ☐ Golden Glow Headlights
- ☐ Illuminated Destination Signs
- ☐ Keystone Steel Gear Cases
- ☐ Safety Car Lighting Fixtures
- ☐ Keystone Motormen's Seats
- ☐ Faraday Car Signals
- ☐ Keystone Trolley Catchers
- ☐ Shelby Trolley Poles
- ☐ Samson Cordage
- ☐ International Fare Registers
- ☐ Fare Register Fittings
- ☐ Keystone Cord Connectors
- ☐ Keystone Rotary Gongs
- ☐ Standard Trolley Harps
- ☐ Standard Trolley Wheels
- ☐ Automatic Door Signals
- ☐ Keystone Trailer Connectors



The Cost of an RWB Dynamotor Saved in Five Months

Five months ago the Superintendent of an electric railway property with less than eight miles of track purchased a Type BB Dynamotor for his shop. Now this machine is not only paid for by the savings which have resulted but is earning money by reclaiming parts around the shop which otherwise are scrapped.

All kinds of electric welding are being done. This includes both carbon and metallic welding and for the latter, either a positive or negative electrode is used, depending on the particular requirements. The operator is also greatly aided by the use of the Arc Stabilizer. This he connects in the welding circuit when metallic welding is to be done. It carries the arc over voltage fluctuations which otherwise would ordinarily break the arc. This allows him to handle the electrode more freely and concentrate his attention on the weld rather than the arc itself. These particular features have enabled the operator to produce ductile and lasting welds. Then, too, each job is begun with confidence of success, because of these versatile and helpful characteristics of the Dynamotor. That has resulted in larger savings owing to the proper reclamation of certain parts which ordinarily are not successfully welded.

Next spring, the Superintendent is going to use this same portable Dynamotor for rail bonding and track repairs such as building up worn and cupped rails and manganese special work. This will be satisfactorily done at low cost with the Type BB Dynamotor and then there will be an added satisfaction in doing this track work with a unit which has more than paid for itself in the shop.

Why not try a similar plan now? The Dynamotor can save you money in the shop this fall and winter and then will be ready for track work when it is needed in the spring.

Information and prices will be gladly given on both Type BB and WW Dynamotors. The Type WW is used for Carbon Arc Rail Joint welding, bonding, track repairs and as either a one or two operator metallic welding set in the shop.

Rail Welding & Bonding Company
Cleveland, Ohio

What puts this little car ahead?

Speed with Safety!

Necessity is the mother of invention, they say, and necessity demanded something to get ahead of the jitney. Remember how they used to run ahead of the old slow starting, hand-signalled trolley, and pick up all the fares?

Necessity required action to save millions of invested captal from ruinous competition. Resourcefulness, ingenuity and inventive ability came to the rescue and produced the modern safety car, fast, quick-starting and safe. With it, and as part of its essential equipment came—

National Pneumatic

Door and Step Operating Mechanisms · **Door and Step Control**
Safety Interlocking Door Control **Motorman's Signal Lights**
Multiple Unit Door Control

As Applicable to Old Cars as to New!

Investigate Now!

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
Originator and Manufacturer
50 Church St., New York McCormick Bldg., Chicago
Works: Rahway, N. J.

WHAT OUR FACILITIES MEAN

FOR instance, our tonnage output.

Were the entire capacity of our Bayway, N. J., mills devoted to the production of trolley wire alone, they could produce more than enough wire annually to equip the country's entire electric traction mileage.

That *is* volume production! And, as every purchasing executive knows, volume production of such proportions permits the manufacturer:

a. To produce a better quality wire.
b. To sell it at the right price.
c. To meet the urgent delivery requirements of his customers.

Consider also our location!

On tide-water, almost at the entrance to New York Harbor, and contiguous to all the important trunk line terminals, it means not only exceptional routing facilities, but advantageous rate differentials obtainable through rail and water shipments to points South and West. What we really offer our buyers is purchasing economy of the highest type.

AMERICAN COPPER PRODUCTS
CORPORATION
200 BROADWAY NEW YORK

TO BUYERS OF COPPER WIRE

AS to the quality of *our trolley wire*, just a word.

The improved methods of manufacture that characterize our plant, are in none of our products more notable than in our trolley wire.

> *For it is a fact that our trolley wire does not depend upon a hardened skin for its strength and for its long life and service.*

Our trolley wire is made in a way that insures uniform hardness throughout its entire cross section.

The result is a record for extra car mileage that any operating or purchasing executive may point to with pride.

COPPER PRODUCTS

Round Bare Wire
Bare Strand
Trolley Wire—Round and Shaped
Flat and Square Bare Wire
Tinned Wire and Strand
Weatherproof Wire and Strand
Copper in Rolls
Rolled Rods
Drawn Rods—Round, Square and Rectangular
Slow-burning Wire and Strand
Bus Bars

BRASS AND BRONZE PRODUCTS

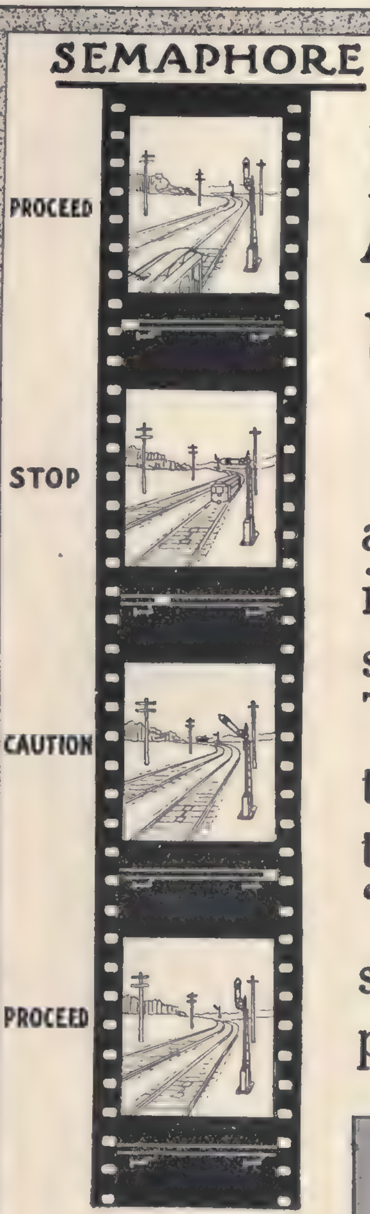
Brass and Bronze Sheets
Brass and Bronze Round Wire
Brass and Bronze Flat and Square Wire

Mills, Bayway, N. J.

AMERICAN COPPER PRODUCTS CORPORATION

Trade Mark

200 BROADWAY NEW YORK

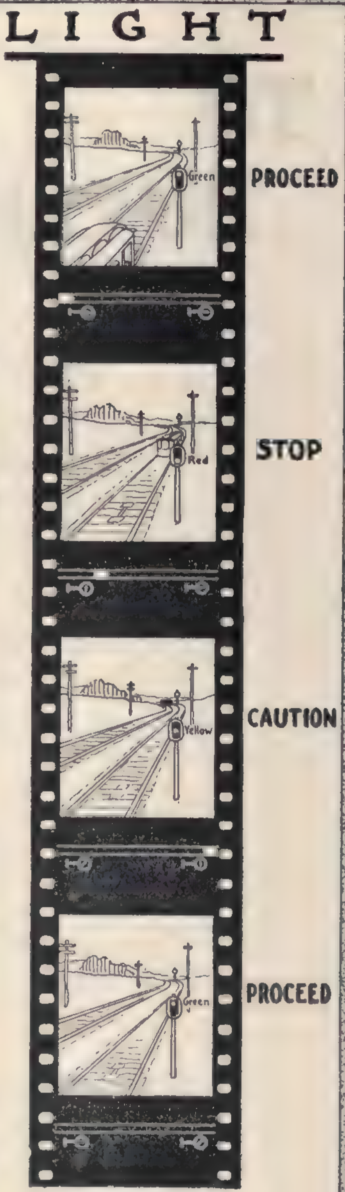


FOR DOUBLE TRACK
Interurban Railways

Union automatic ▪ block signals ▪

afford a simple system of indications easily understood by trainmen.

The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.



On the New York State Railways

On the San Francisco-Sacramento Railroad

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line*.

Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark

Trade Mark

Make Repairs with Better Overhead

To secure the advantages of Bates Steel Pole construction it is not necessary to change the entire line over, if you think that too radical.

Build the next extension with Bates Poles, or install them singly for replacements wherever it becomes necessary. A Bates Pole here and there where other poles have lived their life and been removed may look odd at the start, but the appearance comparison will be in favor of the Bates Pole.

You'll have an opportunity to compare Bates Pole strength, first cost, maintenance cost, and other features with the poles you have been using. Probably you'll find that Bates Poles are best for your property.

Write our engineering department for data and prices of Bates Poles. The present prices are less than prices for any equivalent poles.

Bates Expanded Steel Truss Co.

208 South La Salle Street, Chicago, U. S. A.
District Offices in all Principal Cities

BATES ONE PIECE EXPANDED STEEL POLES

AJAX ELECTRIC ARC WELDER

Most Practical Machine for Track Maintenance

Designed, tested out and perfected before being placed on the market, by men of long experience in the maintenance of electric railway track and special work. It possesses to the highest degree these features which are so pre-eminently important in the average class of railway work.

Manufacturers of

UNIVERSAL
Rotary Track Grinder

ATLAS
Rail Grinder

RECIPROCATING
Track Grinder

DIAMOND BRAND
Grinding Wheels

Portability—Weighs only 155 lbs. is 18 in. wide, 36 in. long by 28 in. high. Convenient hinged carrying handles. Can be transported on any car platform.

High Amperage means deep penetration—333 amp. at 600 volts, 200 amp. at 300 volts. Practically 50% higher capacity than any other resistance machine on the market, ample for good welding under all ordinary conditions. Good also for carbon arc welding.

Accessibility—All parts easy to get at, all circuits plainly traceable, all repairs easy to make with unskilled labor.

Completeness—equipment includes everything necessary to start work—no extras to buy. Even the face shield, trolley pole, cables and welding handle are included.

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

AGENTS:

Chas. N. Wood Co. Boston	Electrical Engineer & Mfg. Co. Pittsburgh	Atlas Railway Supply Co. Chicago	P. N. Wood New Orleans

Railbound Manganese—

Design 507

Design 526

Design 909

FROG DESIGN 507

closely follows the lines of our manganese hard-center frog which has given such excellent results on heavy traffic steam roads. The manganese center is accurately ground to fit the rail section and the frog is held solidly by heat-treated Mayari chrome nickel steel bolts. It is made flange bearing unless otherwise specified.

MATE DESIGN 526

is used in place of solid manganese for many locations due to its increased length, greater width of bearing on the ties, lower cost, and due to the fact that joint connections at toe and heel are made with standard angle bars to rolled rails. This mate is designed to withstand extreme traffic conditions. It is made flange bearing unless otherwise specified.

SWITCH DESIGN 909

represents a distinct improvement in tee rail construction. The solid one-piece manganese heel and spacer block acts as a seat and bearing for our improved "Big Pin" tongue. The tongue is made of manganese steel with a heavily reinforced flange along the side. It is held back firmly against the heel and down on the bed by a simple take-up wedge and bolt.

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

Sales Offices:

New York Boston Philadelphia Baltimore Washington Atlanta Pittsburgh
Buffalo Cleveland Detroit Chicago St. Louis San Francisco

BETHLEHEM

Special Track Work

“United Railways
1442 Economy

7 0 2 3
KILOWATT HOURS
C
B
A
ECONOMY ELECTRIC RAILWAY METER
SANGAMO ELECTRIC COMPANY
SPRINGFIELD ILLINOIS
WATTHOURS PER DISK REVOLUTION
ECONOMY ELECTRIC DEVICES CO.

How It Inspects

This is a rugged watt-hour meter. Top dials for motormen's power-saving records. Lower dials for car inspection use.

When the meter-driven hand on dial A reaches the marker set for this car at 6, the barnman knows that the brakes and controllers have done their work and are due for an inspection equivalent to that otherwise made daily.

Likewise dial B shows when the car has done sufficient work to require oiling. This supplants the usual time or mileage period for oiling.

Dial C shows when the car has done sufficient work to require general inspection.

After any inspection the meter-driven hand is set back to zero by means of its reset rod at the bottom of the case.

A lock prevents unauthorized resetting of inspection dials.

The Economy meter with inspection dials is readily adaptable to any electric car or locomotive operating condition.

To Save Power At The Car
To Save Labor At The Car House

Meter The Energy—

# of St. Louis" Buys Meters

With Car Inspection Dials

As a factor in its campaign for the highest efficiencies in giving good street-car service in a metropolitan district the United Railways of St. Louis has just ordered 1442 Sangamo Economy Railway Meters, with which to equip all its city and suburban cars.

This large purchase follows a general investigation of power saving devices on other large properties and the actual operation of two lines in St. Louis, of widely different characteristics, whose seventy-two cars were first equipped with Economy Meters in April, 1922.

These tests showed the energy saving which could be expected from a complete installation of Economy Meters and also gave the operating officials a measure of how much reduction in daily maximum demand would accompany the 24-hour reduction in energy consumption.

The United Railways of St. Louis will operate, with an Economy Meter on every car and will inspect every car on a kilowatt-hour basis.

Over one hundred street railway companies in the United States have standardized on these rugged time-tried devices for energy saving. Let us quote on your requirements or answer detailed questions.

Economy Electric Devices Company
L. E. Gould, Pres., Old Colony Bldg., Chicago

National Railway Appliance Co., New York
L. A. Nott, San Francisco
Burton R. Stare Co., Seattle

Cable Address: Sangamo, Chicago
Alfred Collyer & Co., Montreal, Quebec

Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis
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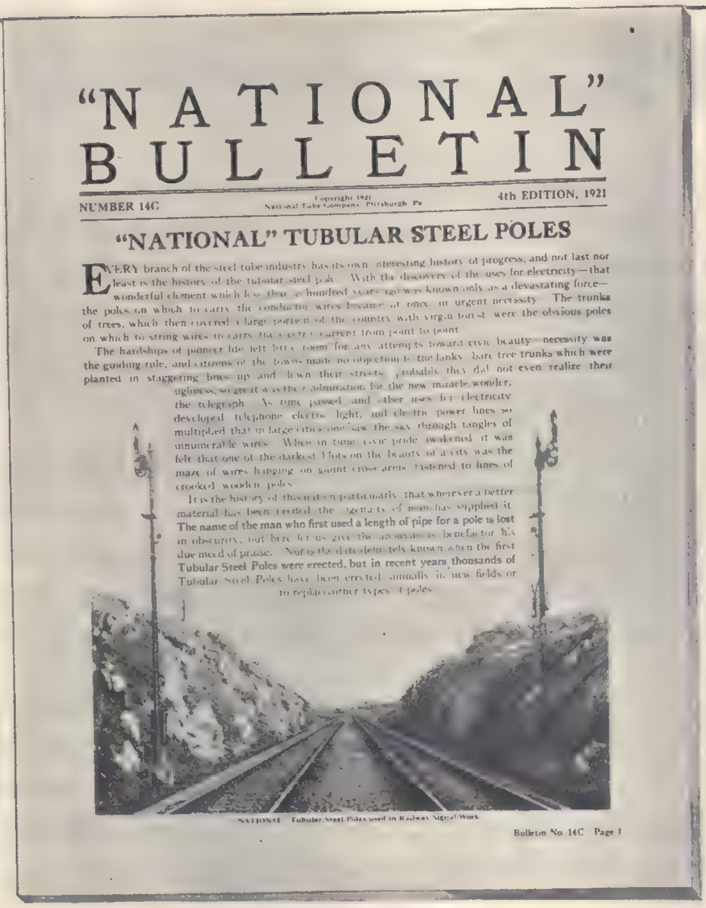
That's What You Want To Save



"NATIONAL" BULLETIN

NUMBER 14C

Copyright 1921
National Tube Company, Pittsburgh, Pa.

4th EDITION, 1921

"NATIONAL" TUBULAR STEEL POLES

EVERY branch of the steel tube industry has its own interesting history of progress, and not last nor least is the history of the tubular steel pole. With the discovery of the uses for electricity—that wonderful element which less than a hundred years ago was known only as a devastating force—the poles on which to carry the conductor wires became at once an urgent necessity. The trunks of trees, which then covered a large portion of the country with virgin forest, were the obvious poles on which to string wires to carry the electric current from point to point.

The hardships of pioneer life left little room for any attempts toward civic beauty—necessity was the guiding rule, and citizens of the towns made no objection to the lanky, bare tree trunks which were planted in staggering lines up and down their streets. Probably they did not even realize their ugliness, so great was their admiration for the new miracle wonder, the telegraph. As time passed, and other uses for electricity developed, telephone, electric light, and electric power lines so multiplied that in large cities one saw the sky through tangles of innumerable wires. When in time civic pride awakened, it was felt that one of the darkest blots on the beauty of a city was the maze of wires hanging on gaunt cross arms fastened to lines of crooked wooden poles.

It is the history of this nation particularly that wherever a better material has been needed, the ingenuity of man has supplied it. The name of the man who first used a length of pipe for a pole is lost in obscurity, but here let us give the anonymous benefactor his due meed of praise. Nor is the date definitely known when the first Tubular Steel Poles were erected, but in recent years thousands of Tubular Steel Poles have been erected annually in new fields or to replace other types of poles.

"NATIONAL" Tubular Steel Poles used in Railway Signal Work

Bulletin No. 14C Page 1

Worth While Information on Tubular Steel Poles

CONTENTS OF "NATIONAL" BULLETIN No. 14:

Tubular Steel Poles for (1) Trolley Lines or Tramways (2) Telegraph and Telephone Lines (3) Lighting Poles (4) Transmission Lines; Characteristics and Advantages of "NATIONAL" Tubular Steel Poles; Joints; Tests; Modern practice with regard to Sizes, Lengths, Joints, Repairs, etc., of Poles; Considerations of Installation and Service; Pressures, Stresses and Loads of Poles; Tables, giving essential pole details; Tables giving properties of Pipe; Ornaments and Fittings. This Bulletin also contains eighty-three illustrations. A very desirable publication for any executive or engineer interested in line pole installations.

Send for your copy of this Bulletin to-day

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

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LORAIN

Butt Welding

Bar Welding

Electric Welding forges the steel while the weld is being made

A durable, lasting weld demands one indispensable element. The metal must be FORGED, either by pressure or by hammering, while the metal is HOT.

The two Lorain Processes are the only processes that accomplish this.

Think it over before you decide on ANY process.

The Lorain Steel Company

General Offices: Johnstown, Pennsylvania

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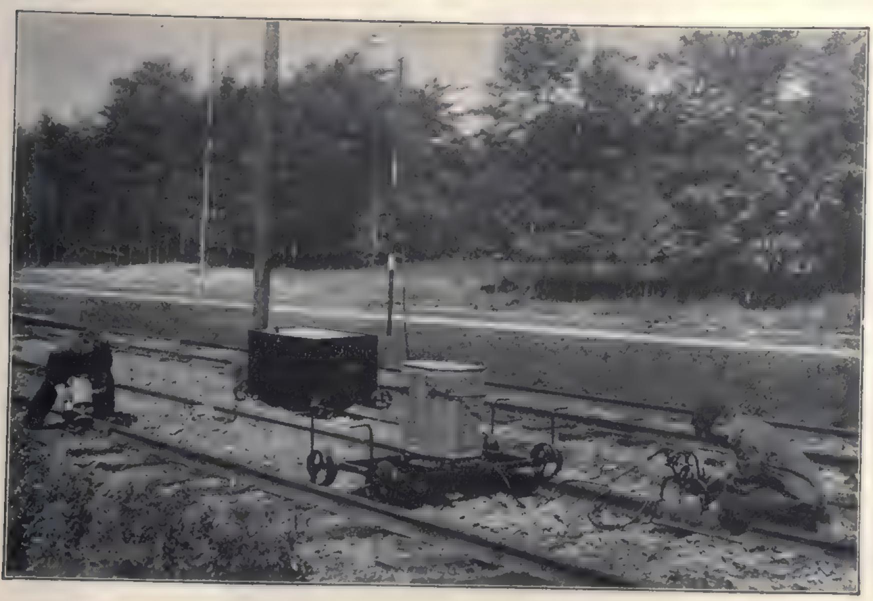

The Series Type Bonding and Arc Welding Outfit is designed to apply the superior ERICO Brazed Bonds quickly and economically.

ERICO SERIES TYPE
Bonding and Arc Welding Outfit

Demounted from the wheeled Larry, the Series Type Rheostat is a compact, easily transported unit, particularly adapted to the installation of ERICO Arc Weld Bonds.

THE ERICO Brazed Bonds are superior to all other types for extended bonding, due to their very high conductivity and exceedingly low cost of installation.

ERICO Arc Weld Bonds are very economical for pick up and special bonding, their application requiring only the lightest equipment, and the services of a single operator.

ERICO Bonds are, type for type, the lowest priced on the market. Let us quote you.

The Electric Railway Improvement Co.
CLEVELAND, OHIO

ELRECO

Two-in-One

Railway span-wire supports and lighting poles combined—a sensible and economical policy for every city, town and public utility company to pursue.

In seventy different cities and towns they are using Elreco Combination Railway and Lighting Poles, with a substantial saving in money to all concerned and a marked improvement in the appearance of streets.

Handsome and efficient G. E. Novalux lighting fixtures are provided. The best is none too good for your city.

The leading features of Elreco Poles are—

Lowest Cost—Lightest Weight
Least Maintenance
Greatest Adaptability

The Electric Railway Equipment Co.
Cincinnati, Ohio **30 Church St., New York**

Miami, Florida

POLES

Knock $6,000 a mile off your

Low Cost to Install No Cost to Maintain

BRIEFLY, the ties are attached to the rails—rails blocked to lever—and concrete is poured exactly as in ordinary paving.

Dayton Resilient Ties form a rigid, reinforced concrete bed. Yet each tie rests on its own highly resilient cushion of asphalt under the wooden-block rail support. A special form of joint-tie insures against low and uneven joints.

DAYTON

track construction estimates

and specify permanent and economical construction

THE SCIENCE of track engineering is nothing more than the correct application of certain fundamental principles to track construction at a cost that makes the outlay justify the layout.

The outstanding feature of Dayton Mechanical Ties—*Resiliency*—is the application of such a principle.

The cushion feature allows just the right amount of rail deflection to absorb the shocks that sooner or later pulverize the concrete, crystalize the steel and rack the rolling stock to pieces.

Dayton Mechanical Ties will moreover save you $6000 a mile over wood ties, laid in concrete.

If you are interested in a quiet, durable track with no comeback, drop us a card today and we'll be glad to send you complete information.

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Resilient
TIE

They Cushion
the Shock on
the Rolling Stock

1859

WHARTON QUALITY MANGANESE
IS ULTIMATELY

All Special Trackwork Layouts Are Assembled and Carefully Checked In Our Yard Before Shipment

WM. WHARTON,
EASTON,

SALES OFFICES:

Boston, Mass.
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1922

STEEL SPECIAL TRACKWORK THE CHEAPEST

Stack of Wharton Solid Manganese Steel Girder Rail Switches in Storeyard of One of the Largest Street Railways in the Central West

JR. & CO., INC.

PENNA.

Other Plants:

TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.

PHILADELPHIA ROLL & MACHINE CO., Philadelphia

TIOGA STEEL & IRON CO., Philadelphia

When you buy

A DIFFERENTIAL

You Get:—

AN AUTOMATIC DUMP CAR which is most economical for maintenance and construction of track and roadway.

A TWENTY-FIVE TO FIFTY TON ELECTRIC LOCOMOTIVE at less than half the cost of an ordinary electric locomotive. Excellent for switching purposes.

A POWER HOUSE CAR for ash disposal and coal hauling.

A FREIGHT CAR which hauls sand, gravel, stone, coal and other material for your own departments or outside contractors at least possible cost.

A SNOW PLOW which has all the advantages of a single purpose snow plow and does not sit idle for ten months of the year.

With these essential railway equipments combined in one, Differentials can work with economy 24 hours a day, 365 days a year.

The Differential Steel Car Co.
Findlay, Ohio

U. S.

Electric Signals

Operating cars on single track, without an efficient signal system, will cost you, sooner or later, a good round sum in damages when the inevitable accident occurs. Perhaps you have had one already. Look out for the next!

A very small amount invested now to purchase and install United States Electric Signals will be not only the means of preventing such a disastrous occurrence, but it will enable you also to speed up your line, to operate more cars on quicker schedules without double-tracking and without additional turnouts.

Get our estimate on a complete installation. You need signals!

and

Automatic Track Switches

Type 16

Quick acting electric track switches have become a real necessity in the operation of snappy, up-to-date service, especially where safety cars are used.

Our new Type 16 switch, recently placed on the market after exhaustive tests of many months' service on several Massachusetts roads, is of simplest construction, yet so rugged and so well-protected that maintenance troubles and expense are practically eliminated. The trolley contactor mounts on standard ears—a factor which will appeal to experienced line-men.

Electric switches—good ones—save time of cars on the road. *Speed up.*

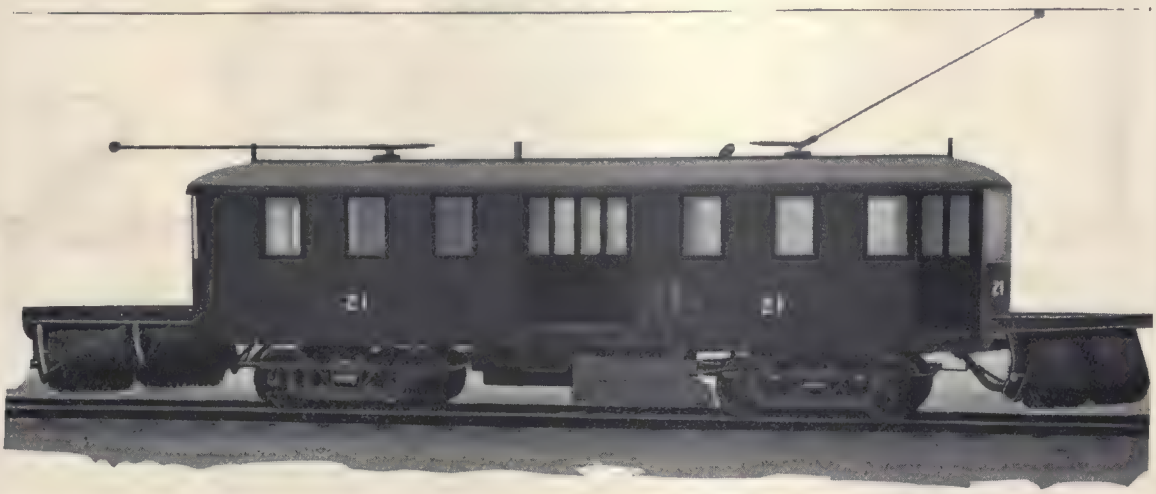
SEND FOR FULL DESCRIPTION AND PRICES

For Faster and Safer Service

United States Electric Signal Company
West Newton, Massachusetts

Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England

Snow Fighting Equipment



Double Truck, Steel Underframe Sweeper

THE utility and economy of this Combination Snow Sweeper and Baggage, Express and Work Car are obvious. It is adaptable for service in all seasons of the year. Extreme length is 49 ft. 1 in. over the brooms. Exterior width over all is 8 ft. 6 in. when used as Snow Sweeper.

The car body over the buffers, with the brooms removed, when used as a work car is 35 ft. 0 in. in length.

The underframing of the car is entirely of structural steel, sills being 8 in. "I" beams; buffers 7 in. by 3– in. angles. The frame is is braced diagonally, making the same very rigid and strong. The super-structure of the car is of wood, of standard baggage car construction. Car is sheathed both inside and out. Roof is of the "turtle deck" type, covered with No. 8 cotton duck.

Brooms and broom-driving mechanism, also the side plows can be readily removed in order that car can be used as express baggage, or work car during summer months.

Blueprints and specifications will be submitted on request.

Selected Snow Sweeper Rattan on Hand, ready for Immediate Shipment.

McGUIRE-CUMMINGS MANUFACTURING CO.

GENERAL OFFICES
111 WEST MONROE STREET
CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars, Snow Sweepers, Electric Locomotives.

Saving Money on Lubrication

"HOW much per gallon?" asks the inexperienced buyer. "I want to save money."

"How much per service unit?" inquires the practical purchaser of lubrication. "That's what I must know to determine true costs."

And which is right? Can service be measured in gallons? No more than wages can be regulated by the *size* of the employe, instead of his ability!

Street railways do not use oil, but *lubrication*—the service obtained from oil. The value of the oil must be gauged by its contents in lubrication units.

There has never been a question of Galena Oil quality. It is universally conceded to be the best. There has been too much proof accumulated through comparative tests with other lubricants to permit any reasonable doubt of the superior lubricating quality of Galena Oils.

Yet there are instances where price per gallon appeals to the purchaser as the deciding factor in buying lubricants, without consideration of the *service* obtained from the gallon.

While the cost of lubrication, compared with other maintenance costs in street railway operation, is a small item, its influence in regulating other expenses is most important. Whenever and wherever used, cheap railway lubricants have given inferior service. The cost of repairs and replacements made necessary through their deficiencies, if added to their first cost, would make the price per gallon surprisingly high. The value of the time lost with hot boxes and cars out of service, still higher.

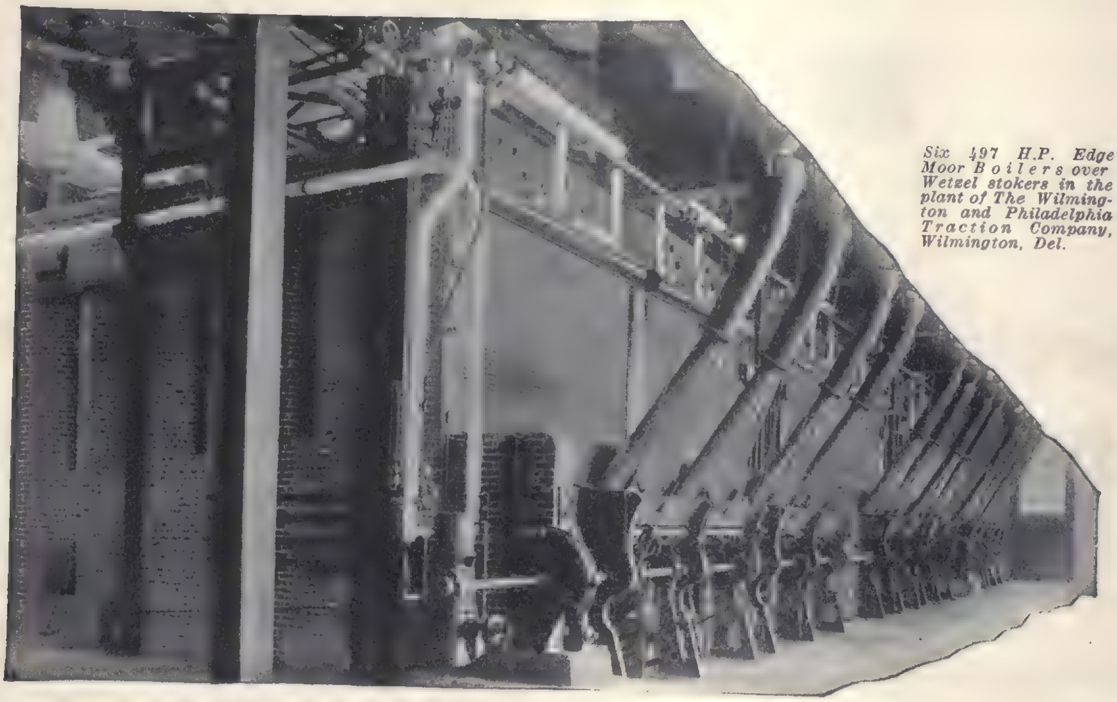
The type of service exemplified on the hundreds of electric railways under Galena lubrication should prove a safe and reliable guide for the purchaser. A comparison of the results obtained, with those on railways using other lubricants, must stand as convincing proof that Galena Oils are not only the most efficient but the most economical as well.

"More miles to the pint;
Better service to the mile."

Galena-Signal Oil Company

New York • Franklin, Pa. • Chicago
and offices in principal cities

FOR INCREASED FUEL ECONOMY



Six 497 H.P. Edge Moor Boilers over Wetzel stokers in the plant of The Wilmington and Philadelphia Traction Company, Wilmington, Del.

Fuel Economy was Never More Important

The protracted coal strike of the past months emphasizes the ever-present need for fuel economy. The importance of obtaining the utmost return from every fuel dollar is no less in times of industrial peace.

Fuel economy begins and centers in the boiler room. The boilers themselves are the most important factor in any program of fuel saving.

Edge Moor Water Tube Boilers are built for the express purpose of utilizing every possible B.t.u. in the fuel burned under them. The unrestricted connection between header and drum that is a feature of Edge Moor Boilers gives them exceptional capacity for quick steaming. Fluctuating loads and high overloads can be carried without damage or loss of efficiency.

The Edge Moor catalogue explains the important features of this boiler that contribute to fuel economy. Your request will bring a copy promptly.

EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE

New York **Pittsburgh** **Chicago** **St. Paul** **Charlotte** **Boston**

EDGE MOOR BOILERS
EDGE MOOR, DEL. U.S.A.

EDGE MOOR Water Tube BOILERS

Results of
B.A.&P.
Electrification

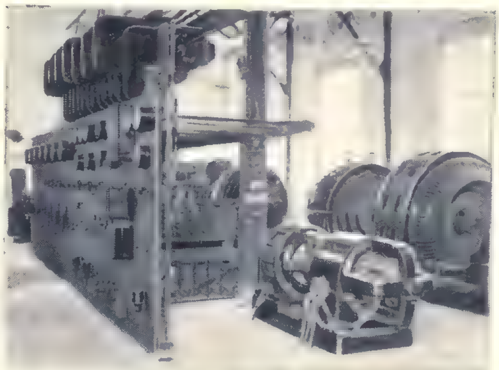
Water Power saved $150,000 the first year

General View and Interior of 60,000-kw. generating station of the Montana Power Co., supplying power to the Butte, Anaconda & Pacific Railway.

THE first year of electrical operation of the Butte, Anaconda & Pacific showed a net decrease in operating costs of $257,899. More than $150,000 was saved for "fuel" due to utilizing electrical energy generated from water power.

After allowing for depreciation, the total net saving was equivalent to 20.02% of the entire cost of electrification, in addition to the increased capacity of the road, improvement in the service, and more regular working hours for the crews.

The B. A. & P. is a pioneer example of the successful substitution of electricity for steam as motive power. It is one of the few instances where actual operating costs have been available for comparison. The results have fully exemplified the economies possible from railroad electrification.



Anaconda Substation, Butte, Anaconda & Pacific Railway

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-155

Results of
B.A.& P.
Electrification

Heavier trains hauled at higher speeds

4500-ton ore train and typical freight train on the B. A. & P.

GREATER tonnage at higher speed and with fewer delays during electric operation of the Butte, Anaconda & Pacific has resulted in economy to the company and in shorter and easier hours for the crews.

During one typical month, 2.94% more trains were operated with a total reduction of 75.12% in time lost due to delays of all kinds.

The decrease in the average time per trip of 27.5% in spite of a 35% increase in tonnage per train resulted in a decrease of 73.5% in overtime in this service and 42% in total time.

On the Missoula Gulch line, with a ruling gradient of 2.5%, a single crew with double-unit electric locomotive replaced two steam locomotives with complete crews.

The net result was a total decrease of $64,381 for engine men's and train men's wages during the first year of electric operation.

Comparison of Steam and Electric Operation for One Month

	Steam 1913	Electric 1914	Increase %
No. of trains	272	280	2.94
Average tonnage per train	1761	2378	35
Average No. trains per day	12.5	9.3	25.6*
Average time per trip	2hr. 25 min.	1 hr. 45 min.	27.5*

*Decrease

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

Results of
B.A.&P.
Electrification

Maintenance reduced 10¢ per locomotive-mile

THE saving in locomotive repairs and engine-house expenses on the B. A. & P. due to electric operation ranks next to the saving in power costs. The low cost of maintaining the electric locomotives (some units have been in service since the electrification in 1913) deserves the consideration of all railway men. For instance:

—Average life of Grade F pinions, 100,000 miles; motor brushes, 12,000 miles.

—Only 21% of contactor tips replaced after 7 years service; average life of pantograph rollers, 1 year.

—Not a single main commutator has ever been turned on account of wear.

—The 118 motors recently operated for 23 months without an armature failure of any kind.

—The average cost of repairs over the past 5-year period has been approximately 6 cents per locomotive mile as compared with 16 cents for steam locomotives in the same service.

The sturdy GE-229 motor has helped to keep down maintenance costs. It was the first railway motor designed for 2400-volt d-c. operation and has made an enviable record.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

Results of
B.A.&P.
Electrification

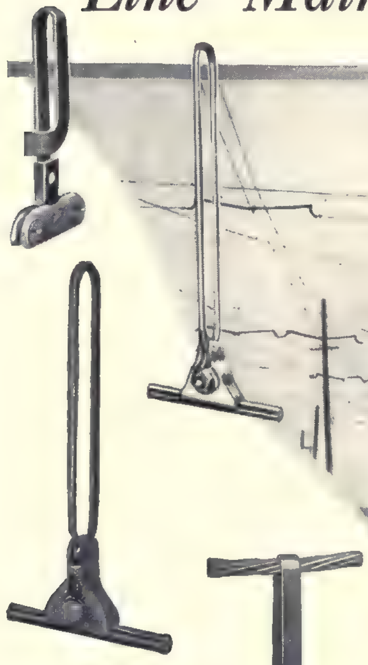
Line Maintenance only $153.76 per mile

Terminal yard construction on the Butte, Anaconda & Pacific.

ON the whole 120 miles of electrified line, which is in a rough mountainous location with traffic very heavy and frequent, three men, using a 1½-ton tower truck with car wheels maintain all overhead lines and feeders. F. W. Bellinger, Elec. Supt. of the B. A. & P. reports:

"The contact system has withstood continuous service and has done practically all that any system could do under similar conditions. The temperature ranges from plus 100°F. to minus 35°, and sometimes 50°F.; nevertheless the maintenance cost per mile, including bonding, for the past five years, averages $153.76."

This is an exceptionally low figure—another instance which demonstrates the durability of G-E Railway Line Material.



Special G-E Catenary line devices used in maintaining the B. A. & P. overhead construction.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

40-246

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ELECTRIC RAILWAY
JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
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Volume 60 New York, Saturday, October 7, 1922 *Number* 15

The Symposium versus Formal Papers in Convention Programs

A FEATURE of the programs at the Chicago convention this year was the use of symposiums to a certain extent in place of formal papers. The result was highly satisfactory and should be continued. The principal virtue of this kind of a program is that busy men will consent to prepare short papers, when each realizes that he shares the responsibility for the success of the discussion with a number of others as well informed as himself. An invitation to prepare a five-minute paper does not seem formidable, whereas a half-hour address is, to many, a formidable proposition. Each contributor of a short paper is likely to put into it the meat of what he would say in a much more extended discourse.

There are, perhaps, some objections to the symposium plan in that it usually does not encourage discussion from the floor and sometimes symposiums become extended in length, due to too many invitations being sent out. Unless well planned, there is also some likelihood of overlap and repetition.

However, during the present convention the good features of symposiums were more evident than the bad ones. A particularly valuable symposium this year was that dealing with public relations. More like it should be encouraged in the future. Another innovation, symposium-like but not so formal, was the "Interurban Hour" of the Transportation & Traffic Association on Thursday afternoon, which was productive of many valuable suggestions.

Chicago as a Meeting Place

THE two principal criteria by which the desirability of a city for a convention is judged are attendance and size of exhibits. The former indicates the relative ease of access, quality of hotels and reasonableness of hotel rates, etc., while the latter registers the viewpoint taken by the manufacturers. Judged by these two standards the Chicago convention was successful, and the convention reached a larger number of people with a better program, both as regards sessions and the exhibits, than ever before. The association is now fortunate in having at least two cities shown by experience to be capable of entertaining an annual convention. Of course, much of the success of the Chicago convention was due to the notable work in preparing for the convention by the local committees. This work was especially praiseworthy because so much of it had to be of a pioneer character, but a foundation has been laid upon which future committees can build in any subsequent Chicago convention.

The arrangement of the exhibits in a comparatively narrow hall in place of a wider one on the whole proved superior, in that the exhibits had more frontage and less depth, and hence could more easily be inspected, although the plan necessarily made a longer distance between the pier entrance and the meeting halls. The arrangements for the latter, which necessarily were of a temporary character, were not quite what might be desired, as the partitions separating some of the rooms were far from sound-proof, and it was difficult at times to hear all that was said from the platform. This and the ventilation of meeting rooms and the commissary arrangements are matters which should be improved for any future convention on the Municipal Pier.

The fear that the delegates would "scatter" because of the many outside attractions in a large city like Chicago, as compared with Atlantic City, proved groundless. One reason perhaps was that the pier is somewhat removed from the center of the city, and another was that there was so much to interest and attract on the pier. This is the first annual convention to be held in the Middle West in ten years, and for this reason, if for none other, the selection of Chicago for this year's convention was justified.

The Engineering Association's Relation to Heavy Electric Traction

IN ITS REPORT to the Engineering Association this week, the committee on heavy electric traction reported lack of success in its efforts to bring about some kind of a joint committee on electrification. At last year's convention a resolution to make such an attempt was passed in the hope that a clearing house could be provided to prevent duplication of research work in this field. The committee did not secure the favorable reaction from other organizations which was hoped for and recommended in effect that the attempt be abandoned. There was a ray of hope, however, in the statement that the steam railroad men would probably form some kind of a joint committee among themselves. This would be a step in the right direction and would be welcomed by the Engineering Association even if it were not invited to co-operate.

However, no matter what is done in the steam railroad field there will always be plenty of work for a heavy electric traction committee in the Engineering Association. The most constructive work which this committee can do was well emphasized by some of the speakers at Monday afternoon's meeting. Originally this committee considered that heavy electric traction was interurban electric railway work and freight handling, and there was a sentiment expressed that the committee should return to this field for the major part of its work. This may be wise, but there is also work for this committee to do which is not being done elsewhere in the line of railroad electrification, the direction in which the committee's efforts have been expended recently.

This association, containing many electrical engineers, men not directly interested in or influenced by steam railroads themselves, is in a position to collect and formulate data and thus record facts upon which future developments may take place, rather than upon opinion. Furthermore, the electric railway man cannot but be interested in steam railroad electrification though he cannot hope to keep in touch personally with all developments. This committee can well interpret these developments to him annually.

In the interurban field, Chairman H. A. Johnson of the subjects committee did well to recommend that the committee turn its attention somewhat to a study of freight haulage on interurbans, the self-propelled vehicle on interurban rails and some of the problems of high-speed interurban work, all from an engineering standpoint.

The committee is available for that which the Engineering Association desires and will no doubt respond to instructions as to its activities.

How Many Assignments Should a Committee Have?

IN THE report of the committee on reorganization, presented to the Engineering Association on Monday, concentration of effort on fewer subjects each year was urged. This raises the question as to the proper number of assignments to be made to a committee, a question which annually arises to trouble the subjects and executive committees. Obviously the answer is not to be found in a fixed and arbitrary number, for subjects vary in importance and in difficulty. But there must be an answer, which evidently was not found if the reorganization committee's criticism was well founded. What are the characteristics of the answer?

A standing committee of the association is in one sense the watchdog which serves to apprise the members of what they ought to know in its field. Possibly its first function, as a group of experts, is to determine the relative importance of topics assigned and to direct attention to others which may have been overlooked. Two or three of those which are of most immediate urgency should be tackled. There should be at least one topic of live general interest which will serve to keep the committee stimulated and furnish educational material for the membership generally. Then provision should be made for the completion of unfinished work left by previous committees so that the results of this work may be made available. Finally, contacts should be maintained with other organizations covering the same field as that of the standing committee or allied ones. No line of investigation should be assigned to a committee unless there is prospect that its work, if properly done, will be fruitful.

Last year as this, the subjects committee followed the commendable practice of submitting to the convention, after the presentation of a report by a committee, its recommendations as to the subjects for that committee for the ensuing year. This should have insured an equitable distribution of subjects for last year.

A suggestion has been made that the subjects committee of the Engineering Association prepare a standing list of live subjects, keeping it continually revised as suggestions are received. From this list a few outstanding items could be selected and assigned, with due allowance for the miscellaneous items outlined above. This would insure an interesting and practical program for each year's work and minimize criticism like that made this year. While this plan is suggested for the Engineering Association, it is applicable to all of the associations.

Statement on Substitute Ties Ignores Experience

IT IS not surprising that a part of the report of the subdivision of the way committee which dealt with the subject of "Design of Substitute Ties" was withdrawn at the convention. This report was widely distributed over the country. To the convention, therefore, even though withdrawn, the statement to which exception was taken has created the general impression that the engineering committee assigned to the study of this subject is decidedly skeptical of the merit of present substitute ties. While the withdrawal indicates that this may not be true, yet it is felt that this statement, which has thus gained circulation in printed form, should not be permitted to go by without bringing the question of its worth to the attention of those not in attendance at the meeting.

Thoughts were set forth in the statement withdrawn which seem to disregard much of the general knowledge and experience on the subject. The basis for the report was the replies from forty companies to a questionnaire sent to sixty-four companies, only twenty-four of those replying having had experience with substitute ties. Even the tabulation of these replies does not seem really to support the position taken in the withdrawn statement.

The sentence withdrawn from the report contained these five thoughts: (1) Because "Electric railways generally incase their ties in concrete and protect them from weather by paving, it is believed that (2) the additional investment required in forms of substitute ties and (3) the lack of a thoroughly suitable design for street railway purposes (4) tend to make them an uneconomical proposition and (5) account for the lack of interest by electric street railways."

1. Just how the encasement of ties in concrete and protection by paving is a consideration, it is difficult to see, since this applies as well to wood ties.

2. The matter of additional investment required in substitute ties is not pertinent, for this is more than offset by the saving in concrete possible thereby on account of the greater bearing area, wider permissible spacing and shallower depth of the steel ties. In fact, the saving in first cost of track has been one of the main selling features.

3. As to the lack of a thoroughly suitable design, the worth of this premise hinges on the word "thoroughly." The statement is probably correct on this point, for the present ties no doubt have not yet reached perfection.

4. If the use of substitute ties does reduce the first cost and makes at least as durable a foundation as concrete and wood ties, then it would not appear to be an uneconomical proposition.

5. The lack of interest pointed out in the statement is not apparent when it is known that of the two principal manufacturers now supplying substitute ties, one has sold more than 34,000 ties so far this year and a total of more than 115,000. The other has sold in 1922 more than 60,000 ties for approximately 360,000 ft. of track, and a total in the past twelve years of 295,000 ties to 140 electric railways. One of the interesting things about this use of steel ties has been the repeat orders placed year after year and the very large number in use by some companies. One street railway now has 60,700 in use; another has 66,400.

It would seem that the unfortunate reflection cast on present available designs of substitute ties by the circulation of this report is not well founded.

Why Optimism Is Justified at This Time

In His Presidential Address at the Chicago Convention of the American Electric Railway Association Robert I. Todd Proved by Statistics that the Electric Railway Industry Is on the Up Grade—At the Same Time Continuous Publicity Is a Necessity

THE keynote of Robert I. Todd's address was struck in the opening sentences, in which he said that prosperity is increasing on most of the city electric lines of the country, and their managements are keeping pace with riders by buying liberally of equipment and supplies. Improved financial conditions are being translated into better service almost everywhere. Probably no industry is doing more to bring the business of the country back to a pre-war basis than this one.

This generalization was justified by Mr. Todd by reference to the following data: Reports from companies taking in one-third of the total electric railway revenue of the country indicate that during the current year 21.6 per cent of the operating expenses of the industry will be devoted to the purchase of materials and supplies, or about $136,000,000. In no year between 1902 and 1917 was the expenditure more than $104,000,000, and the average was about one-half of what is being spent this year.

During the first half of 1922 a total of 1,016 passenger cars of all types were ordered, which is 122 more than were bought in the twelve months of 1921. It appears likely that purchases this year will double those of 1921. Allowing for companies which are not prosperous, and there are some, and adding capital expenditures, the industry will spend for equipment and supplies this year about $200,000,000.

As to operating statistics, Mr. Todd said that reports from about three-eighths of the industry, as measured by mileage, for the first seven months of 1922 show that riding is on the increase, and at the present rate of increase approximately 75,000,000 more rides will be taken this year than last. This is attributable to general improved business conditions.

Despite the increased number of riders, however, gross revenues are off more than $5,500,000, or 2.6 per cent, in this three-eighths of the industry, due to the lighter traffic early in the year and to slight fare decreases. Fares generally are remaining practically stationary because the industry is understood to be using its increased fare returns to improve service.

Increased efficiency of operation, said Mr. Todd, is reflected clearly in operating expenses, which have been cut down 7.2 per cent, while car mileage has been reduced only 0.8 per cent. The operating ratio has dropped from 75.2 to 72 per cent or 4.75 per cent; while net revenues have increased 11.8 per cent. The use of one-man cars, automatic substations and other labor-saving devices, and the abandonment of unprofitable and unused trackage are responsible for these figures. Material and labor costs also have been reduced somewhat during the year, materials now being about 50 per cent higher than they were prior to the war, and labor slightly more than 100 per cent higher.

R. I. TODD

Mr. Todd's analysis of the interurban situation was not so encouraging, as the interurbans show a tendency to lag behind the urban systems in recovering from the effect of the war and the industrial depression. When general business lags, the interurban loses both passenger and freight revenue. Motor-bus competition also affects both of these sources of interurban revenue. The interurban has not a monopoly of its business, as the urban lines have, as there is always the competition of the steam railroads, while fare increases are limited by this competition. However, the interurbans are holding their own and discharging well their obligations to the public; better times for them are anticipated. As to piratical bus and jitney competition, this, Mr. Todd said, is still making inroads on receipts, but is gradually being put under proper restraint. All that the railways ask is that buses be made to pay their fair share of burdens in the way of taxes and be subjected to control like the electric railways. Once this is accomplished, there will no longer be a bus problem, for they cannot survive. Twenty-three states now classify buses as common carriers and more cities are regulating them daily. Soon all buses will be rated as common carriers.

In Mr. Todd's opinion the industry's public relations are better than ever before, traceable to frank dealing with the car rider. The railway story has been told through executives, employees, advertisements and other channels, while honest newspapers everywhere are helping the electric railways to get back upon their feet. No greater mistake could be made than to neglect to keep the public informed regarding the railways' activities.

As to the financial problems ahead, Mr. Todd said that these are still serious. New money must be raised through the sale of securities in the next few years, and this can only be had on the basis of the prosperity of the industry. A start for new financing is already being made, and more financing will be done if the progress of the last seven months is sustained. It behooves transportation men to keep in close touch with every new development that enters into the transportation business and to adapt to their purposes the best of the new developments. In addition, the public must be informed of the evil consequences of any move that would weaken the electric railways and hamper them in providing the service the people demand.

Mr. Todd then went on to explain the part which the association can play in the development of the industry, particularly through the information bureau, making a plea for prompt response to requests from headquarters for information. He also showed how excellent results can be secured through co-operation in the publising of the association magazine and in the work of the advertising section.

Mr. Todd's outstanding suggestion was that every one in the industry should do his utmost to inform his patrons of the basic facts relating to the electric railway business. The public must be brought to realize that it is impossible for competing forms of public transportation to prosper in a given community. It is as foolish to permit unprofitable and destructive competition in public transportation as it would be to have several postal systems competing for business. The people should be made to realize the gross inequality that exists with reference to taxation and other public charges as between motor vehicles operating in the streets and the railways.

As to fares, also, he said that while it is true that the lower that fares can be kept while maintaining a proper return on investment, the better satisfied the public will be, yet fares cannot be made lower than will provide all the costs of giving adequate service and providing a fair return. When unfair competition impairs the earning power of a railway, either service must be diminished or fares increased. Fares will be lower in proportion to the reduction of charges for paving and other public obligations, and to the lessening of the cost of fuel and labor, and they will be lower due to increase in patronage. As costs are increased, fares must increase.

In conclusion, Mr. Todd thanked the executive committee for efficient work and faithful attendance at the monthly meetings, and the officers, executive committee and members generally for their hearty co-operation and splendid support.

Suggestions on Merchandising Transportation*

Make the Car and the Service Attractive and Show the Public You Wish Its Patronage—Instances to Illustrate This Maxim Are Cited

By Edward Hungerford

Publicist, Rochester, N. Y.

THERE are two ways in which the merchandising of transportation may be accomplished. In one the passenger buys his transportation—just as he goes in to the nearest post office and buys a postage stamp. He needs the convenience of the stamp—or the trolley car—and he pays for it. It is a cold-blooded commercial transaction. He can take the postage stamp or he can leave it. There is no selling force placed back of that transaction. The patron can easily—and generally does—gain the impression that his presence, or his 2 cents, are not particularly needed around those parts. Really, he is not a patron. The favor is generally being done by the large concern that is selling him the small stamp. At least this is the impression that is given.

I have known in my day a number of railways—both steam and electric—who sold their transportation in precisely this way and then sometimes wondered quite blandly why they did not enjoy a fuller meed of public confidence and public friendship.

The other way of selling transportation is to sell it.

Here it is that the patron at once is placed in his true light. The railway is the one that is anxious to complete the transaction. It seeks the patron's favor. It catches his attention. It heralds its wares. It endeavors to create a desire upon his part to partake of them. This is real salesmanship. The other is a mere ordinary garden-fed sort of a buying and selling transaction and is unworthy of any special study or consideration.

EDWARD HUNGERFORD

The real selling of transportation is a highly specialized art. A study into its great possibilities is forever filled with fascination—and generally highly profitable.

The one method—if indeed you can dignify it by such a name—wins no friends for a railway; putting the thing more positively, it very frequently creates many enemies for it. The other method—the far-seeing, broad-visioned one—may be the salvation of some critical situation.

It is of this last method that I am going to speak this morning.

BROOKLYN TWENTY-FIVE YEARS AGO

It is about a quarter of a century now since the trolley road here in the United States first began to try and popularize itself by some crude beginning steps in the merchandising of its transportation.

That was about the time when I first came to live in Greater New York—as the metropolis of this country was then quite popularly known. I boarded in Brooklyn. The B. R. T., in those days, seemingly had little time for fussing with such seemingly fine details as a consideration of merchandising its product. It was too busily engaged in trying to reconstruct out of a hodgepodge of steam and electric railways, of every size, condition and vintage, a real metropolitan transport system for a community which was just upon the threshold of coming into its own. Yet somewhere in that early organization there must have been some one in whose fertile mind there had been sewn a tiny seed of transportation merchandising ability.

For upon quiet summer nights one saw passing through those pleasant shaded streets of Brooklyn town open trolley cars gaily illuminated with a hundred or more incandescent bulbs of a variety of colors and filled with parties of Brooklynites young or old bound to the beaches or off to the open country. These cars were held for the use of chartered parties. They were continued in use for several seasons. Then some efficiency man came into the offices, figured out just how much juice those pretty lamps burned, how once or twice upon a rainy night the whole lightly constructed fandangle had short-circuited and burned itself out—and the cars were abandoned.

Yet the cars themselves represented a very early effort toward accomplishing the end to which an important committee of your association is today bending every effort to accomplish. They were, in their crude fashion, merchandisers of transportation.

The old-fashioned cross-bench open-car, itself, is a merchandiser of transportation. In my day in Brooklyn we continued the use of hundreds of these somewhat antiquated bodies, even though it involved twice a year an interchange upon the trucks of them of a standard closed body. They still are in use in both Brooklyn and Manhattan—by the hundreds.

I know, myself, the arguments that are raised against this old-time form of trolley car. They are valid arguments—the safety factor, probably the most forceful of them all. Yet the fact remains that not one of our American car builders today is giving us a vehicle that for passenger-catching ability can hold a candle to the old open-bench trolley car. Right here is a something for you gentlemen who are so earnestly striving to market the transportation of the American electric railway to consider—and consider both long and well.

Granted that the open-bench car is in many ways inefficient and that because of the very ease that it offers in ingress and egress it has a high accident factor, the fact remains that it gives a method of riding more closely approximating that of the open automobile—the most lusty and popular competitor of the street railway—than any other form of trolley car. There is an old-fashioned comfort about this vehicle which cannot be gainsaid. From its comfortable seats one sees the town or the country—and sees them well. While if he be a smoker—upon a pleasant day or a warm summer's night—the old-time open-bench trolley car seems to be a little corner of an earthly paradise.

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*Abstract of discussion on report on Merchandising Transportation at convention of American Electric Railway Transportation & Traffic Association, Chicago, Oct. 2, 1922.

SOME MODERN METHODS ARE CRITICISED

To the man who once loved this type of car, what is offered in its place? A highly efficient, highly scientific contraption upon wheels in which the passenger feels that he is being put through a sort of a machine—like a sheet of paper going through a printing press. You have not as yet come to placing turnstiles in our trolley cars. I shudder even at putting the suggestion into your minds, and shall threaten yet to become the leader in a vigorous and radical nationwide anti-turnstile campaign—but in the multiplicity of little machines that place burden or annoyance upon the patron rather than upon the street railway or its agent is a force that is constantly tending to counteract all the sincere efforts that you gentlemen are taking toward popularizing all of your great properties.

I am a trolley passenger.

I enter the precise door that is designated for me to enter the conveyance that is to bear me to my destination. In the fine town in which I live one is never quite sure whether the entrance is to be by the front door or the middle one. However, this is a mere detail. We shall let it pass. Somewhere in the car the conductor takes my money. When he sits in the middle of the car I think that right there is a single modern American trolley-car device that is of real benefit to the passenger's convenience.

In our nice town the trolley-car fare is 7 cents—no more, no less. I believe that our trolley company is honestly entitled to that 7 cents—perhaps it should have more. It has accomplished marvels in the past few years in the betterment of a service that a half a dozen years ago was a reproach to one of the most forward looking cities in America. It has not done all that it might do, and I doubt if the company itself would claim that it had. But it has bettered its cars, vastly bettered its tracks and above all things it has succeeded of late in manning its cars with a fine group of motormen and conductors.

I understand that it pays these men very well. Yet no matter how well they are paid, I do not believe that they are overpaid. And if it were necessary to have them really adequately paid—as clean-cut, decent American citizens—to add a penny or 2 cents or even 3, to my car fare, I should accept the increased cost, myself, with great pleasure in my heart. In fact, I only regret that in Rochester we have not as yet acquired a full service like unto that of the Fifth Avenue Coach Company in New York, where one pays 10 cents and has the absolute assurance of a seat throughout his journey, to say nothing of clean, well-lighted vehicles free from absurd mechanical contraptions and seats arranged apparently with a real desire to meet the comfort of the patron. Of this seating question, more in a moment.

The fare upon our cars is 7 cents.

I stand before the conductor and fumble in my vest pockets for the two odd pennies. If I give him a dime I am loaded down with the three odd pennies. Either way, it is bad. There are no tickets. I wish that there were. The trolley company might sell fifteen tickets for a dollar without a heavy fare sacrifice and have its money in advance. Personally I should be glad to pay 50 cents for seven tickets and tell the company to keep the change. It probably needs it. But in the few weeks that have elapsed since I have come to Rochester I have become more than ever a red-hot enthusiast over Walter Jackson's plan of the weekly trolley pass. I think it the most definite step forward in selling transportation that I have yet seen.

But the passing petty annoyance of fumbling for pennies is not to be compared with the continued one of finding a modern trolley car without a cross-bench seat within it. There are reasons for the longitudinal seats and I think that I know what they are. But there are awfully good reasons for the cross-bench seat and every one of them is a real seller of transportation. The longitudinal seat at the best is a rather uncomfortable one. The cross-bench fellow, on the other hand, almost invariably is a very comfortable one. In it one is assured that no fellow being is likely to walk upon his toes or otherwise injure the comfort for which he has paid—and paid fairly.

Petty annoyances, all of these to be quite sure.

But any business that makes a real success of its salesmanship is not apt to be causing its patrons constant petty annoyances. This may be set down as almost fundamental fact.

I think that I am only setting down the fact fairly when I say that sometimes in the past in the planning of a new car or some other similar facility of street railway transportation too much attention has been paid to the engineer or other efficiency experts and far too little to the passenger traffic manager or whoever it is whose business is to keep in touch with the patrons of the property.

AS A PUBLICITY MAN IN BROOKLYN

Sometimes this last is the publicity man. And I could stand here and talk until dark upon the possibilities of the publicity man in the street railway business—and his heart-rending problems. I have been one, myself, and trust that I may not be accused of undue conceit when I say that I think I was one of the very earliest pioneers in the field. In 1906 the publicity job in a street railway organization was almost an unknown quantity. When E. W. Winter called me to create such a job on the big Brooklyn Rapid Transit system there were few precedents anywhere by which one might be guided. It was indeed creative work.

B. R. T. was at that time perhaps the most hated utility corporation in all America. Frankly, it had fairly earned a good part of this ill-feeling. Several years of incapable and indifferent management had but served to create an additional burden for Mr. Winter to bear when he first came down from the Twin Cities. That he finally succeeded in making such a hopeless derelict into a substantial 6 per cent property is, to my mind, one of the real miracles of modern business romance.

Soon after I took my job, one of the minor officers of the company came to my desk. He was interested in knowing how I proposed to handle it—and said so, quite frankly.

"I suppose," said he, "that you will have to spend quite a lot of your time in educating these newspaper men. They don't understand the officers of Brooklyn Rapid Transit."

I answered with equal frankness:

"Not one minute more than I shall have to spend educating the officers of Brooklyn Rapid Transit. They don't understand the newspaper men."

Here, then, was the basis for the upbuilding of our policy. We abolished a rather silly policy of courtesies to the press that had been in existence for a number of years past, and set up in its stead a policy of frankness and accuracy in our relations with the reporters. In the old days there had been two methods by which the newspaper men had been met by the officers of the company; one was to be good-natured and lie to them, and the other was to be ill-natured and to tell them to go to hell. Both were equally bad. And both were equally prolific in building up ill-will for the company. We tried to be good-natured always and to answer the questions that they asked us, but also to advance information whenever and wherever it was possible. This went so far as actually to calling them up on the telephone and informing them of accidents upon the system. Sometimes we beat their own men to a story.

FUNCTIONS OF PUBLICITY MAN

I shall go no further into these personal experiences. They are now all history, anyway. But before I am done with the important relationship of the publicity man to the selling of transportation I want to make an especial appeal for him. Since 1906 the idea of a public relations man in a street railway organization has made a pretty rapid spread. In most companies he now is regarded as a fairly essential unit in it. In very few, however, is he regarded, even yet, in anything like his proper relationship. In far too many cases he has been hired and is retained as a stop-gap; he is a sop engaged by some general manager in a futile hope that by such a step alone the pounding of the newspapers in some way or other is to be stopped.

Such a hope is indeed futile. A mere slip of an untrained boy, hired at a salary less than one would give a first-class stenographer or a chief clerk, is well to be classed as a futile hope. He may have been some reporter upon a local paper or he may have been drafted from within the organization—that makes but little difference. Neither does it make any very great difference if he be either a man who has had some training in a new but highly specialized profession or one who has some inborn innate talent for the thing, if—

Here comes the if—

None of this will amount to the proverbial tinker's dam unless the publicity man—I like the phrase "public relations" much better—is given the salary, the position and the respect to which it is really entitled.

Let me make myself clearer:

The attorney of a street railway is its arm of defense. That we shall concede at the very beginning. As such an arm he is not only entitled to a large salary—and respect and position—but he generally receives them.

Now will you agree with me that if the attorney or the general counsel of a street railway is its arm of defense is not its public relations man its great arm of offense?

And is it not forever better business and better strategy to have a strong line of offense than merely a capable one of defense?

Is it not better to spend a dollar on good offensive work at the beginning than ten dollars at the end in a defensive fight which has been forced upon you?

These are the questions, gentlemen, which impel me to say to you that it is not alone important, but absolutely necessary, that your publicity man be well trained and otherwise fitted for his job, but well paid and well treated in it. You cannot have a $25,000-a-year attorney and a $2,500-a-year publicity man and expect to accomplish many real, definite, permanent results. You cannot make bricks without straw. And in the long run you must—it is infinitely better that you have him in the short run—engage a man whose training, whose temperament, whose general abilities make him as fit at every point for his important job as your general counsel, by training, by temperament, by general abilities, is rendered fit to direct his.

More than this it is not necessary to say at this point.

FIFTH AVENUE COACH COMPANY

A moment ago and I was speaking of the Fifth Avenue Coach Company in the city of New York. Before I am done talking to you, gentlemen, I want to hark back to it once again.

Although not an electric street railway, it is, in my opinion, today the most outstanding city transportation company in the United States. The conditions that have brought it to this high point are not those that have come to it because of its use of the gasoline motor bus, instead of the electric trolley car, as its unit of operation.

It is successful as a transportation company running in a city street because long ago it seemingly began to solve the real problem of the merchandising of its product.

Which, being translated, means that it has provided clean vehicles, well lighted, well heated, well operated, has succeeded even in the guarantee of a seat to every passenger—has placed upon these vehicles men as its agents who for all-around efficiency and courtesy I have never seen equaled in any other transport company and, finally, has told its story to its public in a frank, direct, modest way. It charges a fare double that of its competitors, and not only fills all the motor buses that it can provide and earns a generous rate of return to its shareholders, but is today perhaps the only transport company in the city of New York whose patrons almost invariably are its friends.

Does the real merchandising of transportation pay?

I think that the Fifth Avenue Coach Company is the full answer to that question.

It pays—and it pays big.

I suppose that it is quite too much to hope in this day and hour that an electric railway company—particularly a city electric railway company—could ever so reorganize its operation and its public relations to provide a-seat-for-every-passenger service—at any price. So we shall have to dismiss at the outset that phase of the Fifth Avenue Coach Company's remarkable success. But there are other phases of it that might well be worth the consideration of the American street railway man.

The question of the attitude of the men upon the platform toward the patron is also difficult—yet it is not unsolvable. Offhand it would look as if the geographical position of the motor bus company, in the most exclusive thoroughfare in the city of New York, would be a great aid toward promoting courtesy among its employees, because of the rather superior and cultured class of patrons that come to it. To an extent, only, is this true. It is not entirely. Upon pleasant days the East Side and the West Side of New York fairly pour themselves out upon the bus tops. They are schooled in the bad manner of the other traction systems of the town. Yet the busmen separately have little difficulty in handling even these fairly difficult passengers—and in retaining their good tempers and their good manners into the bargain.

There is another side of the question that is worth a passing moment of attention. It is almost axiomatic to say that good manners promote a good company morale. Yet the fact that the Fifth Avenue Coach Company, even in the days of the greatest labor shortage, is never without a waiting list of applicants to go into its service is well worth noting. Labor, itself, responds to good manners. I firmly believe this. I also firmly believe that the average workman prefers a job with a clean-cut going concern, with good manners and good cars, to one which is trying to slide along with but a minimum of these things.

But one thing that has interested me very much in particular about the Fifth Avenue company is the design of its vehicles. That they are cross-seated goes without question. Have not I just told you that it is engaged in selling its transportation, not in compelling its patrons to buy it? But the seats upon the roof! There is the rub.

Throughout Great Britain I have seen the double-decked trolley cars, as well as the double-decked motor buses. I have ridden upon dozens of them. And my good friend Walter Jackson has told me much of their remarkable economy and efficiency of operation—of the astounding low weight of the car for each passenger that it carries. Invariably I have returned from England asking my street railway friends here why we could not use the same type of car in this country. Not one of them has ever given me a good and sufficient answer. Our climate certainly—in the larger part of the United States at least—is not more severe than that of Glasgow or of Edinburgh. And for that matter, in the course of a year there are comparatively few days in New York when the upper decks of the Fifth Avenue buses are not well patronized. And the city of New York is not especially distinguished for its mild winters.

The upper decks of the Fifth Avenue buses induce riding. The coach company officers have told me so. If you do not believe it, try to get on one, on even a fairly pleasant day. But we have no Fifth Avenues, a lot of you are going to chorus back at me. To this, I take exception. There are many Fifth Avenues in America these days. The city-beautiful idea has gained thousands of disciples within the past twenty years or so. Moreover, it is the ride that is the thing—and not so much the avenue. The bus conductors have told me too many times of the repeaters who ride back and forth upon their vehicles for the fresh air, the vantage views of an elevated position, the warmth of the sunshine by day and the romantic caress of the moonlight by evening. Some day some traction manager is going to have the courage, the traffic sense and the sense of transportation salesmanship to make a genuine forward-looking experiment with a car of this type. I should like to see Mr. Palmer try it. He knows the immediate popularity that has come to his double-decked buses in Baltimore, as compared with the older and more ordinary type.

All of these things—many more, too—are, or should be, sellers of your transportation, gentlemen. The ramifications of this form of merchandising are so vast, so complex, but so altogether fascinating that I have been tempted to write a book upon them. In a nation where salesmanship in other commodities long since came almost to the status of a fine art, the selling of transportation has too long been a sadly neglected affair. Therefore, I am more than delighted to see the efforts of this association toward promoting it. That these efforts will bring a definite reward I have no doubt.

Strength to your elbows! And in the long run—that inevitable reward.

The Business Situation and Public Relations*

In This Address a Former President of the United States Chamber of Commerce Explains How Normalcy Is Being Resumed, but Warns Electric Railway Men that They Cannot Solve Their Problems Alone

By H. A. Wheeler
Vice-President
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BUSINESS is coming around all right. We cannot expect to go through such a chaos as the war period without an effect on every man, woman and child in the world at some point or in some fashion. We must all go through whatever comes to us in getting back to normal. We need not fear much for the result. Economy must be introduced. While wealth must be produced, economy has not been reinstated in the economic life of the world, neither in government, in corporate life nor in individual life. The largest spenders are those who should be the largest savers today. Conditions are gradually being restored, but they are not yet restored to a normal basis.

In so far as business is concerned, a steady, definite trend back toward a more stable condition is on.

You have been through a period of very high costs of the money you need in the operation of your business and for its extension, and for the development of efficiency. The cost of your money will be obviously less in the refinancing of the next year or two. There is more money for investment available now than ever before in the United States. There is not only money available for investing in our own facilities and services, but there is money available for investment abroad as well.

There is nothing unfavorable in the business situation. Buying has begun to flow again in channels more stable and natural than have existed since we began to move from our period of high inflation. The electric railway business has bridged a period of great distress and has come into easier conditions of operation. But there is no assurance of freedom from political interference.

H. A. WHEELER

We are breaking out of a period of war into a period when there is a demand for a new democracy which is socialistic. One of the chief byproducts of the war is the fact that every man and woman once willing to be guided by the political wisdom and economic sense of those to whom they have looked for advice now assume to be dictators in both political and economic fields. During the war men and women took public positions to meet the country's need, but after they got a taste of public authority there was a residual effect. People enjoy power when they have the right to exercise it.

THE VITAL SUBJECT IS PUBLIC RELATIONS

The subject of public relations which is to be discussed at this convention is of paramount interest today. A better establishment of these public relations is absolutely necessary to your life and to the welfare of the whole people with respect to its public services.

When people desire a luxury they buy it, no matter how costly or of how little worth. Human beings love to pamper themselves, but the moment a service or a commodity becomes a necessity they take a niggardly attitude toward those who furnish the necessity. All thought is lost of equity and justice in respect to the return to the purveyors of the necessity. They do not object to a return of 20, 30 or 40 per cent profit in the purchase price of something they do not need, but the thing that enters into their daily life, that moves them from place to place, or feeds the body, or shelters them, that service or that commodity is relegated to the point of earning power as near as possible to zero. Advantage is taken of the fact that a concern having a franchise which requires it to operate must operate, even at a loss.

The electric railways are performing an essential function in the economic life of the country. This not only reacts favorably to large business because the service makes it possible to draw labor supply from a wide area, but it is just as much an advantage to the workman. The latter, by virtue of the flexibility of transportation, can secure work in various plants and is a larger factor in industrial activity than would be possible under any other circumstances. He may choose the most lucrative and pleasant employments that are within the range of his reach.

But does the workman ever thank the transportation company for making available a broader market in which to sell his labor? He does not. Does the manufacturer, who consistently and constantly avails himself of these agencies of transportation, do anything to show his appreciation for the extended territory that you have permitted him to tap for his labor supply? I have not found it so. The attitude taken is apt to be passive and negative, whereas it is only affirmative action that will be able to uphold and strengthen transportation work in this country.

Men and women want to invest money, and there is a world of money to invest, but they look with doubt upon the securities whose earning power is in the hands of a body that may at any time become a dictator of the conditions under which operation shall be carried on. This is right because people are not going to put their funds into businesses that are not surrounded by proper safeguards.

There is not a satisfactory understanding on the part of the public as to the economics of transportation, nor a proper responsibility lodged with the public service commission for fair and just treatment of that service. In so far as public relations to any line of business are concerned, the public must understand that its dividends for proper treatment of the public utilities will come out of its effort to have that business operated on a high plane of fairness and equity. The public must be convinced that any plan that is being evolved or any plan made for which support is asked has in it some concrete, definite return to it which it can see, feel and know.

THE FOUNDATION FOR GOOD PUBLIC RELATIONS

That is the way human nature is built, and unless the foundation of public relations work is laid with that in mind, there will be failure and unreasonable demands for service will be made.

Most associations came into existence for the purpose of making more money for their members. They were organized because helter-skelter competition of a cut-throat character was found to be destructive of business. This association was developed to stimulate the art of transportation and to determine how best to provide for transportation service at the lowest cost.

If this association could influence the public mind in a definite manner toward a better understanding of electric railway requirements, as it has done along mechanical lines, it could say "We are saved."

There is a public relationship. How can you get the public into your confidence? How can you educate the people to the requirements of urban and rural transportation? How can you cause them to be just and fair in their consideration of this subject? By newspaper publicity of the right kind you can do a part of it, by advertising of the right kind you can do another part of it. But after what you have built up in this great association what you believe to be the best presentation of that service that will tie the public more closely and more sympathetically to you, you want to remember that you are under a disadvantage. You cannot do the task alone, because as an organization having a proper selfish interest in everything that you propose, there will be a certain amount of suspicion of these efforts.

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*Abstract of address delivered at forty-first annual convention American Electric Railway Association, Chicago, Ill., Oct. 2 to 5, 1922.

THREE VITAL ORGANIZED FORCES

We live, today, in a world of organized forces, that have grown out of the last two or three decades. There are three definite forces which have no point of co-ordination, and yet which will exercise a tremendously potent influence upon the powers that control our goings and our comings. These are the forces of organized agriculture, organized labor and organized business. They control the knowledge by which the economic life of our country and of the world is made sound and whole.

In the organized force of agriculture today is one of the most intelligent efforts that have ever been made in the organized life of any industry, through the organization of farm bureaus. These show the farmers how to prepare their soil, what to plant and how to reap. Now they are going to show them how to market, under co-operative leadership.

Agriculturalists are today gathering their plans together for the means of protecting themselves as to price and profits. The day will come when they have accomplished their first purpose, and then they will look over the field and see the relation of their great force to the general welfare.

The force of organized labor is not of sudden growth, and it is a growth that is not going to stop. There is a militancy about it that is dangerous. There ought to be some medium through which labor organizations would teach their membership that the production of wealth is a thing that will give them large returns, and not to expect these large returns from strikes and fights, which result in a loss to labor by reason of the loss of production.

Organized labor learned much from organized business. It is a force that looks for nothing except its selfish advantage, and is less progressive than the force of agriculture. There is a militant selfishness on the part of organized labor that can be summed up in three items: Better wages, better hours and better working conditions.

THE SOLUTION LIES IN CO-OPERATION WITH ORGANIZED BUSINESS

The force of organized business, of which you are a part, and to which you should be linked with hooks of steel, is the most constructive, and the only constructive, force that is operating in this nation in this time of real economic difficulty. Organized business is old enough, has gone through enough, has wisdom enough and has selfishness enough to have begun to see its relation to the common welfare. It has learned that it must stand constantly for this better public relationship to life's industries and life's service. That relationship may not exist fully at the present time, and there may still be a decade or two of further experimentation, to the loss of the public, to the loss of industry and to the general harm to our own constitutional safeguards.

Technically, the machinery of the electric railways is safe in your hands. You will develop it for the common good and your own good, jointly. Practically the relationships which you ought to develop and would like to see developed are capable of development out of your own knowledge and daily contact with the forces which you serve. Then it remains for you to pass these conclusions reached, out of your expert knowledge, to that great body of organized business ready to understand and to give constant thought and attention to your problems as well as the other problems of industry and service. This can be done through the medium of a nation-wide movement, that has no selfishness in its purpose other than the selfish service to the people as a whole. You can go into the campaign with the propaganda which is necessary for this development in order to assure public opinion and political opinion that the conclusions reached as to the necessity for public co-operation are not the conclusions of the craft selfishly interested in the particular proposition which is presented. Rather the proposition has been examined and checked and approved as sound justice and sound economics. In consequence the great body of organized business, intelligent and thoughtful as it is, will stand behind any intelligent and thoughtful and worth-while program of yours and will develop with you and for you these public relations and that public support and that public contribution to your capital that is absolutely necessary to the welfare of the craft.

The Interest of the Street Car Rider*

The Commissioner Shows How Paving Burdens, Excessive Taxes, Unregulated Competition and Other Unnecessary Obstacles to the Giving of Good Service Are to the Detriment of the Rider—Stress Is Laid on the Importance of Co-operation Between Regulatory and Taxing Bodies

By Carl D. Jackson
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THE interest of the street car rider is, of course, service. I am concerned in this paper with trying to point out how that service can be obtained and assured on the most reasonable terms and why unreasonable burdens upon the street car rider should be done away with; what course of regulation and what policy in the end are in his interest to assure him the best practicable service at the most reasonable terms.

The street car rider does not always realize that service can be rendered and continued only where that service is paid for, whether furnished by private corporations or by government agencies. The cost will necessarily include the cost of money invested in the instrumentalities of service. It is of prime interest to the rider that unnecessary and unreasonable burdens of cost shall not be placed upon that service because all such additional and unnecessary or unreasonable burdens are in the end a burden upon the street car rider himself.

One of the burdens on private urban railway operation directly affecting the rider, which bulks increasingly large in recent years, is the municipal or state requirement that street railways shall be responsible for paving within the track zone and its maintenance, and in some instances for the paving on the entire street. There may possibly be slight damage to the pavement in the immediate vicinity of the rails caused by the vibration incident to the passage of heavy equipment, but this is negligible and in no way commensurate with the requirements placed upon the street railways to maintain paving within the track zone and often without the area of the track zone.

While individual companies have succeeded in being relieved in part, at least, of some of these paving burdens, in general they still remain. In all instances the railways, through general taxes, are required to pay a substantial portion of all other pavement costs.

ELECTRIC RAILWAYS INCREASE REAL ESTATE VALUES

The requirements that electric railways pay for paving construction represents in the last analysis an unfair discrimination against the car rider in the favor of the abutting property owner.

The car rider ultimately pays for the

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*Abstract of address delivered at annual convention of American Electric Railway Association, Chicago, Ill., Oct. 2 to 5, 1922.

cost of this new paving, although the abutting property owners profit greatly from the very fact that the street railway lines are on those streets. We have had a concrete case of this recently in Milwaukee. In the fall of 1921, the Milwaukee Electric Railway & Light Company laid a double track on Oneida Street from Jackson Street to East Water Street, costing with special trackwork probably $100,000. This investment permitted the operation of certain cars on Wells Street not previously carrying the cars of this company. The landlords owning the business property abutting on this section of Wells Street promptly raised the rents materially, in some cases to almost double the previous figure, but of all the tenants affected by the increase in rent, only two intended to move. The result clearly indicated that the profit to the abutting property owners was expected to be permanent. Land values on this section of Wells Street have been greatly enhanced by the laying of tracks of the street railway without any cost whatsoever to the abutting property owners.

It should be brought home to every street car rider in the country that every dollar from earnings which the street railway company is required to pay for paving means that there is just so much less which the regulatory commissions can order expended for service or improvements, or so much increased cost per ride for every ride taken.

WHY PENALIZE THE CAR RIDER ESPECIALLY?

The street car company is now treated as though it owned a private right-of-way in the streets. As a matter of fact, vehicular traffic is in many of the cities heaviest in the street railway zone, and in this respect there has been a greatly increased use of the street railway zone for general vehicular traffic in the last few years, owing to the great increase in the number of motor vehicles parking on the sides of the streets. Studies made in New York State show that the vehicular traffic in the railway area amounts to from 40 per cent to more than 90 per cent of the total vehicular traffic in the street. The street car company is not only paying for the pavement worn out by vehicular traffic, but is often paying a larger proportion of the damage done by vehicles in the remainder of the street than is borne by the municipalities with respect thereto. Furthermore, the passengers who ride on street cars are merely using the streets as passengers, as are riders in other vehicles using the streets, and there is no more reason for penalizing the street car rider than there would be for penalizing the rider in any other vehicle.

As real estate values can be made or unmade by routing or rerouting of car lines, there is every obligation upon the owners of real estate not only not to cast unjust and unreasonable burdens on street car riders, but in my opinion to go further and in case of extensions give positive recognition of the benefits accruing to them. The demand for extensions into thinly populated or into unpopulated territory is insistent. The demand often comes from those interested in real estate development, the owners of the real estate anticipating for themselves the profit which will come from increased values through the extension of the street railway system into their territory. Extensions of this nature will not in themselves pay perhaps for years to come. They offer an additional facility but cast upon the general rider an additional burden of cost. They increase the average length of haul which in itself, of course, increases the cost to the average rider.

The problems of extensions is a difficult one. It must be considered in connection with the general benefit of all. There are already many instances where the owners of real estate or industries to be specially benefited by extensions have furnished in whole or in part the money necessary to build them, thus relieving the general rider, so far as fixed charges are concerned, of this additional burden. There appears to be a strong element of equity in the principle that extensions of this nature which cannot pay and must be a burden upon the general rider, and which will be beneficial to specially situated real estate owners or industries, should be financed by those benefited. Assessments for this purpose would be in line with municipal policy in many states, where, for instance, water mains are extended at the cost of the property owner to be served.

Many street railway systems operate under franchises which require the sprinkling of the entire street and the removal of snow and ice either from a zone or the entire street. Both of these requirements are burdens properly to be borne by the municipality as such. They have no more relation to a street car system than they have to any other vehicular traffic on the street, yet these additional burdens are in the end cast upon the street car rider. Undue tax burdens directly affect the cost of service and are reflected in the fares paid by the car riders.

Most of the taxes levied against public utilities have in the past been based on the idea that the utility selling service at rates fixed in its franchise could in no way pass the burden of taxation to the consumer. Legislatures are still making laws which appear to overlook the fact that with rates based on the cost of service, taxation of a public utility is merely an indirect taxation of the users of its service. All laws placing special tax burdens not in line with the fair and equitable distribution of taxes upon utilities are in fact penalizing the users of the service.

TAXING BODIES COMPLICATE THE WORK OF REGULATING BODIES

In few states is there any co-ordination between the regulating and taxing bodies. The old statutes relating to taxation are retained and new ones casting additional burdens of taxation are enacted, while the power to regulate service and rates is placed in the hands of a body having no authority over the burdens imposed under such statutes or ordinances. On the one hand we have the regulating body with the duty of prescribing and enforcing service, and on the other hand we often have a taxing body treating utilities as tax collectors. Efforts on the part of the regulating body to bring about a stable financial condition of the utilities and the fair return necessary for that stability has in some instances immediately met with increased taxes from a body in no way co-ordinated with the regulating body.

The duty of a regulating body to bring about a fair return cannot and should not be shirked, but it is fair to say that increased tax burdens can only add to the difficulty of the regulating agency, in performing its proper functions. Of course, in some states the fixed franchise rates of fare still exist. If it be claimed that in such instances the additional tax burden cannot be passed on to the car rider, it is also equally clear that the increased tax burdens are making it more difficult to render proper service for that car rider. The experience of the last few years, however, has demonstrated to everybody the impossibility of a fixed and inelastic franchise rate of fare, regardless of cost, and it can be only a question of time when franchises of that nature will be superseded in all parts of the country as they already are in most parts of the country. In some states we still have service regulation with no regulation over fares or the financial means of giving service. Such situations are illogical and anomalous and so clearly contrary to public interest that they cannot continue to prevail.

DON'T SADDLE FUTURE COSTS ON PRESENT RIDERS

Some franchises contain very burdensome amortization provisions. Provisions of this sort merely mean that the rider, besides paying what is the reasonable charge for the service rendered including a fair return for the capital furnished in rendering that service, shall pay an additional amount with the idea in view that at the end of a definite term of years or at some indefinite future period the entire investment will be wiped out by this excess payment and the property become governmentally owned, of course, at the expense of the car riders. Excess charges for this purpose would appear to be justified neither economically nor socially. Riders of this generation should not be penalized for the benefit of the riders of the coming generation.

The advent of the jitneys and buses was at first hailed by the average car rider with considerable enthusiasm. It took time and experience to show that the car rider could not have both jitneys and street cars, and it was soon very evident that jitneys and buses could not give the service rendered by the street car systems. They neither offered the magnitude of service, the certainty of service, nor the reasonableness of service offered by the street car systems. In general they confined their efforts to taking the cream of the traffic, the short-haul passenger, with the result that the best paying part of the street railway business was taken from the railways and the average cost per street car passenger was greatly increased.

The remedy for peak-hour traffic problems would appear to be effective co-operation by all parties interested in improving the condition of that service and by effective regulation to insure the best street car service possible without resorting to competition of independent jitney and motor-bus operation, which in the long run simply serve to increase the general costs of transportation to the riding public.

THE PLACE OF THE BUS

That the public has come to take the correct view of the jitney and bus situation seems to be clearly demonstrated where the matter has been brought directly to a vote of the people after the effects of jitney and bus competition have been demonstrated. Wherever any large city has been forced to rely on motor bus or jitney service as its only means of transportation, a chaotic condition has resulted. This was illustrated in the losses of Des Moines, Toledo and Bridgeport. Every city which has been without street car service for any period of time has recognized that this service is not merely a matter of concern to the operating companies, but is vital to the social and economic welfare of the city. The situation demands general power in regulatory bodies to prevent competition of jitneys and buses with essential street car service. In the meantime, regulatory bodies and the public realize that transportation by electric railways will always be necessary; that no substitute has been found for it and that nowhere in the United States in any city of considerable size is transportation being exclusively furnished successfully by other agencies such as jitneys or buses.

This is not saying that there may not be and is not a proper field for motor buses. Recent developments indicate that they may have a very proper place in the scheme of urban street railway transportation as feeders to existing lines and as a means of serving thinly settled territory where the traffic does not warrant the extension of the railway system, but where the general welfare of the city requires that the residents of this section be furnished with some satisfactory means of transportation. Feeder service of this nature should be furnished by the railways themselves in connection with their transportation system and co-ordinated with it.

Any analysis of the street railway situation develops at once the fact that the relationship of the street-car rider and the street-car company is in fact one of mutual interest. Service at reasonable rates depends upon reasonable costs, and it is no longer possible in this country for the car rider to look upon conditions surrounding railway operation with indifference.

All of this goes to show how essential it is that relations of mutual confidence and understanding should take the place of the old way of looking at street railway enterprises. And another factor for good service will be the establishment of good relations with the employees rendering it.

There are those who consider that urban street railway transportation is primarily a municipal function. It may be timely, therefore, to give some thought to the relative advantages and disadvantages of public operation of our urban railways as contrasted with private operation.

PUBLIC OPERATION NOT A PANACEA

Society, as constituted at present, has as yet evolved no successful substitute motive to replace the spur of individual initiative and reward for merit, and this is primarily the reason why private ownership and operation is generally more economical than public ownership and operation. In any business which is a large employer of labor, such as the street railway business, the advantage enjoyed by private capital is especially marked. Discipline in private employment is generally better maintained, and waste of effort more generally eliminated. At the same time the spur for economy in purchases and in all work is generally greater under the private incentive than under government control and operation. The three-year results of operation of the municipal plant at Seattle show a deficit before depreciation of $101,803, and on the basis of depreciation set up on the municipal books, the three years' operation resulted in a deficiency of nearly $2,000,000. When it is considered that this deficiency is before any charges for the taxes which would have been contributed by a private utility to the city, it can hardly be said that the experience of Seattle is encouraging to those who are weighing today the relative advantages of municipal and private operation.

In many cases the results of municipal operation are made to appear more favorable than they actually are because of the failure to make proper separation between the affairs of the municipal utility and the financial transactions of the municipality.

While the unprejudiced students of the relative merits of government ownership and operation will be nearly unanimous in favor of the private ownership and operation of such utilities as electric, gas and telephone utilities, the final judgment may not be as unanimous in regard to ownership of street railway systems in some of our cities. This service is of vital interest to the welfare of the community and the demands for capital investment to meet the growing requirements of some of the larger municipalities of the Union is very great. Meantime, the street car companies, in general, are just emerging from a period of extreme depression which has very greatly affected their credit. In some of the larger cities the demands for capital are such that the requirements can only be financed reasonably through municipal aid. Experience in the past has been such that in some instances it may be impossible to attract private capital into this field upon reasonable terms, except upon some mutually arranged plan for municipal participation, and perhaps, in some instances, municipal ownership may be necessary. However, it would seem that even under such circumstances actual operation ought to be left to private enterprise. In some instances, the advantage of financing by the municipality will result in a lower cost of money than could be obtained through private enterprise. This is largely the result of the credit conditions affecting street railway enterprises in such places during the last few years, the results of old fixed franchise requirements and the impairment of credit due to increased costs of service growing out of general increased costs. As said by the Federal Electric Railways Commission: "Unless the confidence of the investor in the securities of the companies furnishing this essential public service be restored, the public itself must in some way assume the burden of supplying the funds necessary for their continuance."

COST-OF-SERVICE PLANS PROMISING

In many instances it has been found practicable to establish cost of service contracts with the municipalities upon a fair and equitable basis assuring fair protection to the capital invested in the enterprises and reasonable fares to the riding public. The service rendered is so intimately connected with the daily welfare of the rider and the social and economic conditions of the municipality that such contracts are to be encouraged wherever they can be obtained upon a reasonable basis.

The transportation problem is constantly becoming more difficult and more important. As the congestion of traffic increases in our large cities, the difficulty of rendering adequate railway service becomes more acute. The result of this situation is that the public relations problem for the street railways is in general probably more difficult than the same problem as it confronts other utilities.

More and more the well-being of the people and the growth and prosperity of the communities served by the street railways is becoming dependent on good transportation. It is to be hoped that a way may be found through better public relations, through relief from unjust burdens and unfair competition, and through decreasing the cost of capital, for the stabilization of the street railway industry and for the fair treatment of both the rider and the investor. Certainly no reasonable street car rider would desire to deprive the privately owned and operated street railway from a fair return upon the investment or the necessary credit to adequately perform the important functions cast upon it.

National Financing and the Electric Railways*

Experience in Federal Financing Carries a Lesson to Electric Railways — Electric Railways Are Essential and Suggestions Are Made for Cultivating the Small Investor

By Hon. Walter W. Warwick
Former Comptroller of the Treasury of the United States

IN COMING before this association, in response to your invitation, I have thought it best to speak of the relation between government financing and the financing of public utilities. There may seem to be no relation between the two, but I am confident there is. It is often said that a government can secure all the money it wants because it has the unlimited taxing power. It is true a government can take by taxes all the property of its citizens, but a successful national life requires that the people be prosperous and contented. One mistake that leads to discontent and ultimate destruction of any nation is to pursue a course of unnecessary taxation, gross extravagance and failure on the part of rulers or of public officials in a republic to consider the best interests of the people as a whole.

In the years before the war it was comparatively easy to finance the operations of the government. The people hardly knew there was such a thing as federal taxes. The receipts from tariff duties and internal revenue taxes were sufficient to meet all the requirements of the Federal government. The total expenditures were about one billion dollars a year, and the balancing of the budget, or the consideration of receipts and expenditures at one time, was not thought to be an important subject. About ten years ago the debt of the government was less than $1,000,000,000, but as a result of the war the debt rose to about $23,000,000,000. This situation, when expenditures could not be brought below $4,000,000,000 a year, forced the adoption of some method of controlling expenditures and considering them in relation to receipts from taxation. Then was passed the budget and accounting act in June, 1921.

W. W. WARWICK

In the present budget law the president has control of the expenditures of the executive branch, which spends 99 per cent of the public money. The legislative and judicial branches spend together less than 1 per cent. The first large item is our obligation to the soldiers of the late war and to those of former wars, over $750,000,000. The second is the interest on the public debt and a reasonable sinking fund. These require $1,225,000,000 annually. Excluding the postal service, the receipts of the government are but a little over $3,000,000,000. These fixed charges take more than $2,000,000,000 of this sum. Upon the other $1,000,000,000 of expenditures the executive discretion is exercised through a Director of the Budget, an officer created by law to carry out the President's program of scrutinizing proposed expenditures and recommending to the President where expenditures can be reduced without injury to the service or with the least injury when the necessity for keeping expenditures within the receipts makes drastic cuts imperative. I think it safe to say that within a few years the annual budget message of the President, reporting to Congress and to the people the results of the previous year and the proposed program of government activity for the coming year, will be the most widely read of all government publications.

In Congress rapid progress has been made in centering in one committee of the House of Representatives and one committee in the Senate all control of appropriations. The budget law takes from Congress none of its constitutional responsibility to the people for the appropriation of the public money. Congress may reduce or increase any item of the budget submitted by the President. Congress also still retains the power to initiate appropriations that it may believe to be desirable in the public interest.

During the present fiscal year, ending June 30, 1923, there is an apparent failure of receipts and expenditures to balance by more than $600,000,000, it being calculated that expenditures total $3,700,000,000, while receipts of all kinds are estimated at about $3,100,000,000. To increase receipts by sales of surplus property and by other means, and to reduce expenditures so that the budget will balance for this fiscal year, is a task which will test the budget system. The problem must be solved if the credit of our people is to be maintained at the high level which we all demand.

ELECTRIC RAILWAY FINANCING

Your need to obtain necessary funds at a reasonable rate of interest is closely related to the problem of government financing. I come thus to a discussion of the subject of financing the needs of the electric street railways of the country.

I remember well the work of the commission appointed by President Wilson to investigate and report upon the needs of the electric street railway companies, and some time ago when I read its interesting and instructive report I was impressed with the seriousness of the troubles brought on the industry as a result of war conditions. I doubt if the public ever fully realized, during the war, the burden put upon the electric street railways. When the war came on and costs of operation increased, it is not surprising that many patrons of the street railways felt that the companies should carry out the bargain contained in their franchises, even at a great loss. It was not uncommon to hear it said that the companies could pay the deficit out of the enormous profits they had made in earlier years. This state of mind and the antagonism accumulated over a long period of years made it difficult for the street railways to secure a fair hearing when they wished to present their real troubles. Where public utility commissions were in existence it prevented action in granting increased fares as promptly as the situation and the public interest required. But the public has finally recognized that it has a real interest in first-class street car service; that such a service cannot be rendered without paying what it costs, and that cost includes adequate compensation to employees and a fair return on the value of the property. Under public regulation the old protest against paying a dividend on watered stock is dying out. The problem is the problem of the street car patrons. They are the ones to whom we must look for the help to which the industry is justly entitled.

Electric railways have been, and they will remain, our chief means of local transportation. I do not expect to see your industry supplanted by buses. The latter are efficient for light traffic, but they cannot serve mass transportation. I believe the experience in England has proved this. Buses give way to tramways wherever traffic increases to a point to warrant it. I doubt if any large American city could handle its traffic with buses exclusively; certainly not at a reasonable fare.

Electric railways must have new money to make extensions and betterments. How to get this money, amounting to about $250,000,000 a year, is not a question easily answered. I suggest to you the experience of the plain citizen, the man of small means, who bought Liberty bonds and financed our part in the Great War. This citizen, in large numbers, went into the investment business during the war, and now is ready to invest money got out of government securities, or additional savings, in something else. This man is the man for the electric railways or any other vital industry that needs new money and friends. He first learned to save when he bought a government bond on the installment plan.

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*Abstract of address presented at the annual convention of the American Electric Railway Association, Chicago, Ill., Oct. 2-5, 1922.

THE SMALL INVESTOR SHOULD BE SOUGHT

But this plain citizen wants something more than a promise to pay if all goes well. He has taken a course in government finance and is through buying stocks of no value. He wants the best. He wants first of all to know all about your business, just as he did about the Liberty bond when he invested in it. He wants you to render service with his money and to show some personal interest in customers of your lines, just as he would be interested in his customers if he were running a store. He wants to know from you how the other hired men—public officials, editors and others who share in his earnings—are treating his investment, because he wants a sure return on his money just as he received interest on his bonds. He will stand with you and fight with you so long as he is convinced that your methods are honest.

If you want to sell this plain citizen, it is best to be prepared to talk his language. The average financial statement goes over his head and some one who talks plainly will get his support and his money. This plain citizen does not demand that business men be undignified, but he wants them to be understandable and regular. Too many of them, in an effort to make their financial statements dignified, succeed only in making them complex. Your plain citizen needs a plain statement, even if it be one not approved by the best accounting practices, provided it is honest. He understood what the government was saying to him when it sold him bonds, because it talked his language plainly. Furthermore, he liked the treatment he received from the government. Thus has the government broken ground with the plain citizen and his wife for investment in great industries like yours. They are waiting to buy if you can meet the requirements I have set forth.

Of course, the money that all of these plain citizens of the country have available at once will not meet all of your financial requirements, but if you get them behind you, you will not have so much trouble interesting the big investors. Wealthy persons and institutions know that the safest investment today is the one in which the largest number of plain, everyday men and women are interested. The destiny of your business and of the public utility business generally lies with the average citizen, and the closer you get to him in a financial way the better off you will be.

It has been the experience of many lines of business that real prosperity came when it was found possible to make partners or real friends of customers. When it can be said that a large number of the common people, those who regularly patronize street cars, are interested to some extent in the management of the company, it will be certain that the good will of these citizens will be reflected in the better treatment the utility will receive from its community.

Your industry in these days has nothing to conceal. A frank statement of condition, coupled with judicious publicity, will reach the small investor who likes the bond of a local corporation furnishing an essential and growing service. But the management must not be of the absentee landlord class. Local men of reputation and high standing are essential. They must participate in all movements for the good of the community and thus be known as men of broad vision and not as men who prey upon the people.

Character in men counts more than it ever did. When the economical and efficient management of your property is known to the citizens of your city and the substantial business men believe that your bonds are a reliable security, I think it safe to say you will find your money locally. That is your field and it must be cultivated.

Your industry has its best days before it. To its credit is a large part in the building of the American home. It made it possible for men of moderate means to go outside the business sections of cities and there bring up their families in the fresh air and sunshine. Its contribution to the welfare of the nation has been a substantial one. Its future contributions will be even greater than those of the past. As it serves its country more than it serves the King of Profits, it will go on to higher and better days. In the near future it will share with all the people in the abundant prosperity that will be visited upon our land. We must deserve the blessings of prosperity.

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Public Relations and Advertising Men Meet in Chicago

THERE were no dissenting opinions expressed as to the wisdom of organizing a public utility advertising association at the round-table discussion of the public relations and advertising men, held on the Municipal Pier, Chicago, during the American Association convention. W. P. Strandborg, Portland Railway, Light & Power Company, chairman of the committee on organization, appointed at a meeting of representatives of the electric railway, light and power, gas and telephone utilities at Milwaukee on June 13, 1922, presented a prospectus for the organization of a public utility advertising association in which it was recommended that a time and place be selected for further consideration of the plans. At this meeting a permanent name for the association should be adopted. A form of constitution and standards of practice, which are necessary before such an organization can apply for membership in the National Advertising Commission and the Associated Advertising Clubs of the World, were presented in the prospectus and are to be taken up at the recommended meeting. Election of officers is recommended at the same meeting and the appointment of an aggressive membership committee is also recommended.

Membership in addition to being confined to those engaged in public utility work will require assent to the standards of practice for general advertisers adopted at the 1914 convention of the Associated Advertising Clubs of the World. The organization committee was formally authorized to proceed with the organization work, and those present at the round-table discussion pledged themselves to assist the committee as called on individually for specific work. In presenting the report of the committee, Mr. Strandborg characterized the utility advertising men as double barreled orphans, in that they had not heretofore been recognized as an essential part of utility organizations and, as advertising men, have been floating around like camp followers. It has been felt that they have a place and the object of the proposed organization is to fit them into that place.

John F. Gilchrist, Commonwealth Edison Company, Chicago, in expressing hearty support of the proposed organization, declared that he had believed in advertising for many years and said that the companies he represents spend $400,000 annually in advertising, which is about 15 cents per capita. Charles Persons, director of the American Gas Association, and B. J. Mullaney spoke for the gas industry, pledging support of the movement and calling attention to the activities of the gas industry in advertising, saying that it is fully alive to the possibilities in such work. John Spellman, speaking for the Bell Telephone Companies, said that the movement has the hearty sympathy of this group of utilities. George F. Oxley, director of publicity for the National Electric Light Association, said that so far as that association can find out among its members the entire body is in favor of the movement. He said that it is desirable for utilities to do more advertising and devote less effort to getting free publicity of the advertising type. He said that there should be no slacking of efforts to get the facts of the utility industry into the newspapers, but called attention to the fact that properly directed advertising efforts should not reduce the publication of legitimate news of the industry.

Improving Public Relations and Keeping Them Improved

A Symposium

Contributions from Successful Executives Giving the Results of Their Studies and Experiences in a Number of Phases of This Subject Respectively

A FEATURE of the American Association program on Tuesday morning was a symposium on the subject of public relations, presided over by Matthew C. Brush, vice-president American International Corporation.

Mr. Brush opened the symposium with some general remarks and then called on a number of active managers for comments on different phases of this subject. Those who responded were H. B. Flowers, general manager United Railways & Electric Company, Baltimore, Md.; Martin Schreiber, manager Southern Division Public Service Railway, Camden, N. J.; Britton I. Budd, president Elevated Railroads of Chicago; Barron Collier, president Barron G. Collier, Inc., New York City; L. S. Storrs, president The Connecticut Company, New Haven; W. H. Sawyer, president East St. Louis & Suburban Railway, East St. Louis, Ill.; J. P. Barnes, president Louisville (Ky.) Railway; C. E. Morgan, general manager Brooklyn City Railroad, and P. S. Arkwright, president Georgia Railway & Power Company, Atlanta, Ga.

Abstracts of the remarks of Mr. Brush and the contributions of the others named are given below.

The Basis of Public Relations

By M. C. Brush

ONE reason why Mr. Emmons selected me to preside on this occasion, as I understand it, was that my activity in the electric railway industry is not as great as it used to be. I have no authority in any street railway, and he figured that I was the one man who had been connected with the railway industry who dared to preside here on this occasion and get away with it.

The term "Public Relations" is so hackneyed that it is difficult to talk on the subject. It involves, to my mind, 99 per cent of our business. Regardless of what your mechanical devices may be, and no matter what your engineering training or managerial ability or your capacity as an operating official may be, it makes very little difference, in regard to all of these elements of our business, if our relations with the public—I am speaking of public relations in a very broad way—are not what they should be.

M. C. Brush

I think oftentimes we forget, in our efforts to accomplish real genuine success in the conduct of our transportation properties, that we are strictly a manufacturer and a seller of a commodity, namely transportation, and it does not do any good to manufacture this commodity in a good way, unless your relations with those who are to buy your commodity are of the proper kind. Unless you do get the good will of your patrons, you cannot expect to proceed in a broad way, as electric railway men—a type of salesmen—engaged in selling transportation.

The talks that Mr. Wheeler and Mayor Brough gave us this morning are very helpful, and I would like to put what Mr. Wheeler said in a rather different form. I agree with him absolutely, you cannot go on running an industry involving approximately an investment of $6,000,000,000 with the present investment and the additional capital you must have, if you are going to have a disinterested politically appointed body telling you how to run your business. It is not in the cards, gentlemen, and there is no other industry in the world that is subjected to it.

A public service commission appointed by a governing authority may hold office, for two days, for weeks or for months, or for a few years, but it cannot run your properties with my money invested in them, because the fellow who has got to run that property has got to carry with him the responsibility that goes with authority. You have three distinct elements today to consider—the labor union, the public service commission and the president or manager of the electric railway. They are all trying to run the railway, and it cannot be done, and will not be done. Under these circumstances you will never get the public to invest money in the street railway industry until that thing is remedied. I maintain that it can be remedied by establishing right relations with the man who puts up the money. He does not have to put it up, and unless you make the investment attractive, he will not put up the money which is absolutely necessary.

You must establish between the man who puts up his money, the man who gives his time and effort to running the road, and the man who rides and pays you the money for your services, those harmonious conditions which should prevail. There can never be the reciprocal relationship which must exist among these parties concerned, until you have your public relations on a broad and proper basis. If there is any dissatisfaction on the part of one or the other of these parties it is immediately felt and affects the other two.

You cannot have a man on the outside looking in and running your business. If he is going to run it, by heck, he has got to remain inside and look out, and assume the full responsibility that goes with the job. If the man outside thinks he can run the road better than you can, and will pay you back what you put into the proposition, let him run it.

There is not a man among the 110,000,000 of people in the United States who is more opposed to public ownership of public utilities than I am, but you are not going to have the transportation industry, over which you gentlemen are presiding today, successful in its operations, as successful as it should be, even with the character of men who are running it, until the situation I describe comes true.

Some gentlemen said to me several years ago "Can you not run the road and charge a 5-cent fare and make it a success?" I said "No, gentlemen, I do not know how to do that." They said "We do." I answered "Run it," and they did and you all know with what results. The people who elected them to office are the people who are paying the bills, and you have your reciprocal relationship there—you cannot do it otherwise.

I do not care how honest a commissioner I might be, you can never get as genuine a decision from me on any question on earth as you will get when the decision of a question affects my pocketbook. I may be a good fellow and tell you that I will give you a square deal, but when you come around and commence to talk about taking my money, then I will give you the decision which is prompted by the way in which your proposition affects my pocketbook.

I have no suggestion as to how the problem is to be solved. The question of public relations is particularly a matter, to my mind, of human nature. It is perfectly absurd to assume that because somebody in this room happened to be in the hardware business, and then decided to become a street railway man that the mere fact of this change causes a change in his entire nature. It does not. He takes more interest in the street railway business, naturally. The ordinary hardware merchant is not interested in your business until it affects him, but under ordinary conditions if he goes down to the store and has a chance to sell a hammer, he will let you wait; but if there is more money in helping you in your job he will help you.

Unfortunately, it would seem that human beings are such that any given person will think more of his own interest than anything else; his own interests are more important to him than anything else in the world. This idea of sitting down in your office as a street railway magnate and opening your wrist and squirting some juice into it and telling your associates what should be done under any given circumstances will not work—there is nothing in it.

ON THE SUBJECT OF BUSES

I just want to utter one other thought which probably does not fit here, but I may not get this chance again to refer to it. May I make a suggestion to you transportation men, and I use the term "transportation men" advisedly, and not electric railway men.

It is impossible for you gentlemen in charge of this transportation business, with the responsibility for the care and management of millions of dollars, to tell the public what they have got to do. There are some electric railway men that still think they can do that. You members of the American Electric Railway Association—this is my nineteenth convention—you are transportation men, not merely electric railway men. You gentlemen are experts in furnishing transportation. You ought not to sit by and let any beggar buy a truck and put some seats in it and go into this business as a novice, merely because you say the people have got to ride in your cars. The transportation manager should not hold any such idea, because it cannot be done.

Therefore, I want to say that I want to see the men whom I have known so well for so many years become *transportation* men and undertake successfully to furnish that character of transportation which the people want and for which they will pay enough to insure a fair return on the amount of money invested in the business. It is immaterial whether this transportation be by airplane, electric bus, perpetual-motion machine or anything else. If I want to go home from my office, you are the men who can make it possible for me to do so, but you may not tell me I must ride in car number 203 which leaves a certain point at 8:06 if I prefer to ride in a bus.

I saw recently some buses running on a line I built some years ago, where the steel rails had all been taken out. I do not care whether they ride in buses or wheelbarrows, but why permit these parties to come in and undertake to furnish something which you have been trained to do throughout your lives, and to embark in competition with your business, in which you are experts? Five years from today you will find I am right.

THERE ARE TWO SIDES TO THE MATTER OF SERVICE

One more suggestion. Mr. Wheeler and the Mayor of Toledo referred to service. There is one element we put forward in any attempt to advance public relations, and one of the things which you must do in a public relations campaign—which I assume is a twenty-four-hour campaign, 365 days in the year—and that is to recognize the fact that the word "service" not only involves the movement of cars, and the carrying of passengers, but also involves payments to the man who furnishes the service in the form of capital.

In our campaign in Boston in 1918 on the Elevated Railway, we telephoned to 1,000 stockholders in the State of Massachusetts and found that many of our stockholders were trustees of little girls. There was one case in particular, which I recall, where the father had died, and left the little daughter some Elevated stock. Did we get the vote of that trustee in the Legislature? We did. For the point was involved that if the girl did not get any returns on the stock, she could not go to college. The girl was directly interested in what we were doing, and unless she received something on the investment in the stock in the company, she would be in a bad financial condition, and the trustee of the estate would have to take care of her. It is the only way you can get away with it. You cannot talk people into doing something for you unless their interest is involved.

This idea of a street railway man sitting up and being nice to some rabbit representing a public service body—just because you would shoot him if he did not hold that position—is not a very pleasing sight. I can speak advisedly on this subject because I ran some of the shipyards for the United States Government during the war, and my experience in the shipyards was no different from what it was in connection with the electric railways.

Keeping in Touch with Local Organizations

BY H. B. FLOWERS

EVERY community is replete with organizations—improvement associations, lodges, church clubs, etc. The improvement association is usually born because people living in a certain community are dissatisfied with conditions generally; started because streets have not been paved nor sidewalks laid, water and gas mains not extended, transportation facilities lacking or inadequate. These associations are generally headed by officers who, naturally, are able to dominate others and usually also have influence outside of their own direct circle of associates.

It is very seldom that moves for extensions to existing car lines and other added facilities, or complaints about rates of fare, character of service, etc., are started outside of organizations of this kind, but frequently organizations result on account of what would appear to be a concerted effort on the part of a few to obtain betterments, etc.

Most street railway men are of the opinion that local organizations (and by that I mean neighborhood improvement associations and city-wide organizations for the promotion of civic progress) are nuisances. They find themselves frequently in a permanent state of irritation because of the demands made by representatives of these organizations; demands which the street railway officials too often regard as unreasonable.

Whatever may be the experience of those of you from other cities, we in Baltimore have found that these organizations, instead of giving trouble, actually save it. The reason is this: If in a certain locality there reside six "kickers," it is almost humanly certain that each of these six will have a different idea as to how to improve the street car service in his locality; each of the six heads a group which he dominates and which sympathizes with his particular hobby. You seek to create good will in that locality. What happens is that whatever change is made suits but one group and only causes greater irritation to the five other groups, because these others think that they have not only been disregarded but the plan actually put into effect has been a "slap in their faces."

Take this same locality, and create in it an improvement association. It is reasonable to assume that these six "kickers" will be members of it, securing membership with the definite purpose of gaining strength for their particular hobbies or ideas of improving the street car service. The several voices of these six will be aired in the meetings of the improvement association. When the time comes to make a change in service in that locality the street railway company has it comparatively easy. It must do business with the improvement association, and in doing business with it naturally has to do not six different and varying things, but the one plan for the improvement of the service which the organization, in meeting and after considerable discussion, has determined is the best in its plans for that locality. It is collective bargaining with the people just the same as with our employees, and the similarity goes even farther in that when you, by agreement with an improvement association, make a change in the street car service of its particular locality, the association must and does accept its part of the responsibility for not only approving the plan but seeing that the residents of that locality give it a fair trial, and no individual in that locality is allowed, because of the sentiment behind the organization, to attempt to get the street railway to change to some plan which he might personally favor.

It is not well to expect trade organizations, or lodges, of which your officers, or employees, may be members, to "pull your chestnuts out of the fire." To establish confidence in these organizations is the utmost that could be expected. The good effects are reflected in the individual members who are also interested in the improvement association organized to deal with matters in which utilities are concerned.

How I Used Paid Newspaper Space

By W. H. Sawyer

I USE newspaper space because I believe it is good business to do so. A few years ago one of the companies with which I was then connected had a yearly contract with the local newspaper, whereby the company was to pay for $18 worth of advertising space per month, payment to be made in street car tickets. The company officials then did not believe that any amount of advertising space was really worth $18 a month to them, but today that company is paying the same newspaper $6,000 per year for advertising and this is not too much. A perplexing question is how much money it is good business to spend on advertising. Few progressive concerns in any other business spend less than 1 per cent of their gross revenue on advertising, many spend 5 per cent. The average street railway can, with advantage to the company and the community served, spend 1 per cent of its gross earnings on paid advertising. I would rather slightly overdo the advertising than not do enough.

Another problem is how best to utilize the space paid for. We have come through several stages. First we did not use advertising space. Then we hired a publicity man who was assumed to be able to write advertisements from the public's viewpoint. He was generally rather proud of the fact that he was not a street railway man and therefore did not have the narrow viewpoint of street railway men but did have the big, broad view of advertising values, and moreover had a proper conception of how to appeal to the public. In the third stage and present stage the progressive public utility company makes use of a publicity man, upon whom it depends to give thought not only to the amount of publicity, but to its kind and to the wording of the advertisements. He is part of the organization and must know his company's problems intimately. His work should be supervised by the executive in charge of the company like that of any other department head.

All advertisements must have a personal touch and especially those signed by the executive of the company. Such advertisements must be worded either in part by the executive himself, which is preferable, or phraseology distinctive of that executive must enter into the advertisements. Newspaper advertising is the medium through which the executive of a company personally talks to his public, his customers, explaining to them what he has done, what he wants to do and why he wants to do it.

I resent the use of the word "campaign" in newspaper advertising and in most other undertakings. I believe in advertising day after day, week after week, month after month. I believe in consistent, not defensive advertising —advertising calculated to prevent the need of a stone wall defense.

Do not misunderstand me; advertising is not the solution of all our troubles. We may still be unfairly and unduly attacked, but advertising is a duty which we owe to our public, our customers, and it is good business. No company has been criticized by a regulatory body for giving the public the facts which it is entitled to, and many commissions, during the past year, have criticised our public utility companies because they had not advertised. Commissions have openly instructed companies to advertise and give the public facts.

I do not assume that paying for advertising in a newspaper buys the the editorial columns, but I know that the newspaper man believes in advertising, it is part of his creed and belief; he does not believe that you are properly conducting your business from a business standpoint if you take the viewpoint that you do not have to advertise. He does not know whether you are oiling your cars properly, or using your current efficiently, or whether you pay proper salaries, or do the right kind of maintenance, but he does know from his life's experience that in that part of your business with which he is acquainted you are not working along good business lines if you do not advertise. You are antagonizing your cause, you are depreciating yourself in the eyes of a newspaper man when you tell him that you do not believe in advertising, and there is only one way to tell him that you do believe in advertising and that is to advertise.

We sometimes wonder how many people read our advertisements. One thing is sure; the newspaperman reads our advertisements and he knows more about our property than he ever would in any other way. Knowing the facts he is not inclined to attack us as he would if we persisted in withholding facts and information.

Of course, everybody does not read all advertisements. Many of them are not worth reading, or they may appeal to only a limited number of people. But they do, at least, let the public know that we are giving them facts and information; and it is to a certain extent secondary whether they read all the details.

Confidence of the Public Is Necessary

By Martin Schreiber

IF PUBLIC support and service can be separated, all may be expressed as to what is necessary for public support in one word. This you may elaborate any way you choose. That word is confidence. Confidence in turn rests on honest and sincere efforts made for a worthy cause. Analyze any successful business and you will find the same answer.

Unfortunately, the utilities, led by the railroads, built a sort of unpopular screen around themselves for many years, principally on account of the nature of the development of the business and partly on account of too much diffidence toward their patrons. But any close student can now observe that the pendulum is swinging the other way. During the war the government actually carried out the principles that it had prohibited Harriman doing.

How fast the utilities come back will depend on a large measure upon its representatives. In order for a railway company to get the support of the public, the first requisite is to create an organization to work with you. It is foolish to have the general staff of a company struggling for public support, at the same time that the rank and file is giving the opposite impression. This holds irrespective of any pretty posters or trite official statements. Some of the general officers of a company rarely see the car riders, while there are trainmen that may see a regular rider 600 times a year. So, the first job is to get your own employees working with you. That task properly done is probably the greatest one thing to beget public confidence. Here is where a company section and a publication can do effective work. One-third of your men should be company section members and at least a two-page letter should go into their homes twice a month. After that, try to make the personnel of the company a real, sincere sympathetic part of the community. Work for the community through its civic organizations like the Chamber of Commerce or Rotary Club. That doesn't mean for officers or employees of the company to join these various organizations and pay their dues and never show up except when they want something; such a course fools only you or your company. It means to take an active part, showing real desire to produce a greater and better community and stand ready to back up that desire in any practical way that you can. If you belong to the Rotary Club, do not attend the weekly dinner just often enough to retain your membership, but actually enter into the life of Rotary and adopt its principles all the way down the line. Make Rotarians of your employees. It is not difficult. Any one in your employ, even if he labors with his hands for wage, can understand the wisdom of the Golden Rule.

So, I could go along at great length on this subject of making yourself and organization a part of the community in which you serve with transportation. Why should any one not accept a task for making his community bigger or better; that is just plain Americanism. Try it, and you will find for the proverbial "skeleton in the closet," the complaint file, will be substituted letters of commendation. In conclusion, if you do pursue this policy and some time along comes a day that you do want to put some improvement over or get some consideration from the people, you won't have to beg for it and not get it; that consideration, if worthy, will be gladly given. That was my experience when we decided to operate one-man cars, sell the company's stock, distribute metal tokens and introduce other improvements for the good of the community, and I believe it will be verified by any one else that works earnestly along the same lines.

Telling Your Story Through Employees

By C. E. Morgan

HUMANISM is of the essence of modern history. The problem in public utilities differs in many respects from the problem in ordinary private industries. The street railway business contrasts strongly with, for example, the business of gas, power and light, the problems of the latter being more simple both because of the smaller number of employees and the nature of the commodity. The electric railway salesman comes in direct contact with the buyer, while with a telephone company the contact of the salesman is much less direct. Production and selling in the railway industry are largely co-extensive and the employees exercise individual responsibility to a greater extent, perhaps, than in any other industry where large numbers are employed. And so, the public can at all times form judgments, sound or unsound, of the electric railway, the sale of whose service involves immediate personal association between the riders and the company's representatives—conductor, motorman or other agents.

In Brooklyn we are engaged in selling transportation through our 7,000 workers. When the Brooklyn City Railroad resumed independent operations three years ago, new plans were formed and carried out, one vital element being to humanize Brooklyn's transportation system. The transit question was approached from the viewpoint of merchandising.

Gradually, in accordance with carefully worked out plans, the workers became a huge selling force, the commodity being transportation. Following the 1920 strike an effort was made to secure the co-operation of all employees. Mass meetings of employees both of the Brooklyn City Railroad and the Brooklyn Rapid Transit Company were assembled at the depots and addressed by officials. At these day and night gatherings, at which great enthusiasm was readily created, close co-operation was urged between management and employees in the interest of the companies and of the public. The response was immediate and effective, and a new and refreshing morale soon was evident. Closer relations between the management officials and the surface workers was one of the chief aims attained. The result has been fewer accidents, lower operating costs and better service to the public. Every employee is now a salesman, working for the general good. Courtesy is made a prime essential. The letters which come to my office testify to the public's appreciation.

A discouraging situation, involving at the outset obstacles hardly without parallel in the country, has been converted into one of optimism and real achievement. Labor difficulties have been practically eliminated; the public, hostile at first to the point of rioting, is reposing confidence in the management; the press, critical still, but, on the whole, fair, is disposed to treat sanely questions of transit policy, despite the vigorous attacks upon the transit companies by the municipal administration of the city of New York. Broad plans of improvement and replacement are going on, and co-operation between management and employee is becoming more real and effective. Every employee is selling transportation, telling the story of the management's efforts to serve the community, and every rider is becoming a listener. Satisfied, courteous and interested traction workers are becoming a fixed thing in Brooklyn. The story they tell, more effectively by their course of conduct than by any other means, is one of the greatest agencies in informing the general public of the actual attitude of the management.

The sixty-eighth annual report of the Brooklyn City Railroad for the year ended June 30, 1922, disclosed increased earnings, conversion of a deficit into a surplus, an actual total investment largely in excess of capital and bonded debt, better service, extensive improvements, a more friendly and increasing patronage, and, above all, a personnel that works with and for, and not against, the management. Conditions like these are encouraging us to continue the education of our employees in "selling transportation." And as the story is being told and as it is finding willing auditors in the more than 1,000,000 passengers carried each day, the company is moved to make more useful its physical equipment.

In this march forward the employee, or salesman, has had no inconsiderable share. His story is told every minute of the day, and it reacts upon a receptive public. We believe that employee and employer have interests in common and that each should receive that treatment which each side deserves in respect to its rights. No new or unusual methods have been employed. The methods of this company are, it is submitted, the methods of sound business. The public, the stockholders and the employees are all regarded as essential factors in the one great problem whose solution means contented and helpful personnel, adequate return to the investor and proper provision for the needs of the community. Thus does co-operation make for durable satisfaction and lasting progress.

Utilizing Company Mediums

By Barron Collier

AS AN advertising man who believes in his remedy, this is indeed a happy day for me. Not because I have been selected to add my comment to this remarkable publicity symposium, but because I feel that at last we are on the right track to the ultimate solution of our electric railway problems. We are advertising. We are telling our story to the public. And we are getting results.

Two years ago the electric railways of the country were in much the same position as the Kimberley farmer who stood in the center of the wealthiest diamond deposit in the world and bemoaned the fact that his land would not produce crops.

We bemoaned our hard lot because the public did not understand our problems. For all too long a period we did not try to utilize the instruments all around us to make them understand. But today our situation is changed. We have come to recognize the value of our publicity mediums. Think of the change. Two years ago only about 2 per cent of the electric railway companies of the country were doing any advertising. Today, according to the most reliable figures obtainable, the advertising percentage is nearer 80 per cent.

Every class of medium is being used. This is well. We cannot overtell our story. We are prone, however, sometimes, to forget the value of our own mediums. Such as the window sign, the poster in the carhouse, the pay envelope stuffer and other company mediums distinct from company publications, the value of which Mr. Budd has so clearly set forth.

The window sign is super car advertising. How gladly, indeed, would advertisers of commercial lines purchase this space if they might.

Consider some of the manifold attractions of the window sign: It is the only sign which can be printed on both sides and catch the pedestrian as well as the car rider as the car moves along.

It reaches our best customer—the car rider—who in the end says how we shall be treated by public officials. It reaches in the course of every day, on the average, a number of persons equal to the population of the community in which the cars run. It tells our story to the average car rider at least twice a day and, thanks to the weekly pass and other business stimulating plans, more often than twice a day in some cities. It reaches our customer when he is using and enjoying our product—a ride. It talks to a steadily increasing clientele. It capitalizes the force of repetition. It holds the attention of the car rider for the longest time of any medium, for it is to him a traveling salesman who moves along with him in a friendly, unobtrusive way.

Those are some of the natural advantages of the medium. They apply regardless of how our message is written. Force, color and style added to our message compound its value.

Attractive posters well placed around carhouses and in club rooms, terminal stations and other places where employees and customers gather will pay handsome returns on the investment. This is particularly true of posters placed on company property. There the employee's mind is on his job. It is receptive to company messages.

The pay envelope insert is a little thing, but it reaches the employee when he is in the right frame of mind to entertain a suggestion for helping boost his company. That is, it does if he is the right kind of an employee, and I believe that the great body of our men are becoming boosters for us more and more every day.

The hen, we are told, enjoys a higher standing than the duck because she advertises her value to the community more. Likewise, she keeps on scratching regardless of how much corn there is in sight. Here are two lessons which, now that we are struggling upward to prosperity again, we may well keep in mind.

The Use of Company Publications

By Britton I. Budd

NO PUBLIC utility company can give the best service of which it is capable without the co-operation of its customers and of its employees. This co-operation is three-sided, and a company publication can be used to cement and hold together the three sides of the triangle. There are two kinds of such periodicals, each having functions which are distinct though closely connected. The first is intended primarily for the customers of a company and secondarily for the employees. The second is intended for employees only, its function being to inform and interest them in affairs that are closely related to themselves and the company for which they work. I shall treat the two kinds of publications separately, pointing out some of the things which may be accomplished by each in its own field, although I realize that there is some overlapping in their respective functions.

The company publication which goes to customers as well as employees may be used both as a business getter and as a good-will medium, by setting forth the advantages of the company's service, by establishing and maintaining good will between the customers and the employees and by promoting courtesy and safety. Thus, it offers the passenger a medium through which he can express appreciation of an act of courtesy shown him by an employee. That passengers will take advantage of such opportunity has been amply demonstrated in my own experience. The first issue of a little publication of this kind which we began on the Chicago Elevated Lines some six years ago contained no commendations of employees. At present hardly a day passes without the receipt of one or more letters from grateful passengers commending some employee for one of the hundreds of little things which an employee can do to please and accommodate customers. Each issue of this publication now carries from twenty to forty such commendations, the particular employee being identified by name and badge number. Such commendations stimulate employees with a desire to do better work. At the same time, they create a friendly feeling on the part of the passenger toward the company, because a passenger who takes the trouble to write a long letter commending some employee must feel rather friendly toward the company. It is a word from a pleased customer, which is the most valuable form of advertising a company can get and is a valuable asset in public relations.

That is only one of the ways in which such a publication is valuable. On every large property there are always details of operation which the average passenger does not understand and which frequently create irritation and cause complaint. The passenger wishes to know why certain things are done the way they are and why they are not done in the way he thinks they ought to be. When such inquiries are received care is taken to explain them fully in the next issue. We have found by experience that some of these operating details are read with more interest than any other items in the publication. Passengers after reading some explanation of that kind will write letters saying they had often wondered what the reason was, but now it was perfectly clear to them and they were satisfied. Frequently they will end such letters by asking for an explanation of some other detail in a future issue. The effect of all that is that it gets the customer interested in a friendly way in the company and the character of the service it gives. He looks forward to the appearance of the next issue to see the explanation of the detail about which he asked. If you can get your customers interested in your company you get their good will at the same time.

There are many other ways in which a publication of this kind can be made helpful in maintaining good public relations. In recent years many changes in rates of fare have come about and the company publication is a good medium through which to explain the necessity for the changes. This can be done by a plain statement of the facts, avoiding all appearance of complaining or making pleas of poverty. Matter written on this subject should point out the high quality of the service being given and the advantage to the public in having it maintained, rather than to show that a company is not making any money.

The company publication can be used to inform its customers of improvements being made or contemplated. It should tell in some detail the benefit the public will derive from the change and incidentally the cost to the company. If a new class of service is to be installed, explain how it will benefit passengers.

Such items are "news" and are read with interest. The benefit to the company is that the customers talk about it and get the impression that the company is constantly doing something in the way of improving the service. Care should be used in the preparation of such items to avoid all semblance of propaganda. Treat them solely for their news value and let the customers draw their own inferences.

The second kind of publication to which I have referred, the one which is intended mainly for the employees, must be a little different in character from the one intended for public consumption. There are differences of opinion as to the nature of the material to be used and the manner in which it should be presented. In the case of the Chicago Elevated Lines we have the two kinds, and as both are mailed to the home addresses of employees each month, naturally we seek to avoid duplication of news matter. None of the same material is used in both publications, except the commendations of employees. The reason for the exception is that in the employees' magazine we use commendations coming from superintendents and foremen as well as those coming from passengers, while in the other only letters coming from the public are used.

While, as I have said, there are differences of opinion about the kind of material that should be used in employees' magazines, my own opinion is that first of all such publications should be educational and informative in character. They should have a definite purpose in view, and that purpose should be to acquaint the employees with the business of the company by which they are employed.

In every large corporation the great majority of the employees are totally ignorant of the financial and business side of the enterprise. I do not believe that this ignorance on the part of the employees is due to lack of interest in the business of the company, but because the company has not given them an opportunity to learn. The main purpose of the employees' magazine, therefore, should be to supply, in a readable way, such information which can easily be understood. But if it contains too much company business or only long, heavy articles, no matter how well they may be written or how important the subjects are, it will not be read by the majority of the employees.

To make it interesting the greater part of each issue must be devoted to items that are of peculiar interest to the employees themselves. The employees must be made to feel, as far as possible, that it is their own publication and to accomplish that the company must be kept largely in the background. For one item dealing with purely company affairs there should be three dealing with the activities of the employees themselves. The magazine should chronicle all the activities in which the employees are interested, such as ball games and picnics in summer and indoor athletic meets, dances and other entertainments in winter. If such stories are illustrated with plenty of pictures it will add to the interest.

Some company publications seem to rely on their attractive appearance to arouse interest, rather than on the matter they contain. I believe that is a mistake. Fine paper and beautifully colored pictures will not take the place of interesting reading matter, for the employees know little and care less about the printer's art. They are interested in the little every-day affairs in their daily lives and if such things are written in a sympathetic, human-interest way they will be read and appreciated without respect to the quality of the paper on which they are printed. I do not mean to say that a company publication should be cheap looking. My point is that more attention should be paid to the quality of the reading matter than to the dress in which it appears. That an employees' magazine which is read all the way through is an important factor in building up the morale of the working forces and creating a friendly feeling between a company and its employees there is no doubt in my mind.

Although the two kinds of company publications I have described are somewhat different in purpose, the scope of the first being much broader than that of the second, there is one important characteristic which applies with equal force to both. Both must be well edited if they are to arouse and sustain interest. Preparation of the material should be done by a skilled writer, who not only knows how to write, but who understands and appreciates news values. An engineer, for instance, may know everything about a machine and be able to describe every part in exact detail, but it does not follow that he is able to write about it in a way that will interest the reader. A thing that is worth doing is worth doing well, and that applies to the editing of a company publication. If the publication is left to some department head who has his own work to do and who has had no special training in writing, the result is bound to show in the quality of the work.

If the company publication is the asset which I believe it is to the company, it is important that it should not be merely a piece of printed matter. It should show character and originality if it is to compete with other periodicals making a bid for attention. The worth-while company publication is not produced with scissors and paste pot. It must have an individuality of its own and that can be given it only by one who has special qualifications, training and experience in that line and who devotes time and attention to the work.

Relation of the Press to the Traction Problem

By Lucius S. Storrs

THE final solution of all problems of the public utilities is in the hands of the public, for commissions and regulating bodies embody in their decisions their interpretations of public interest. Further, the traction problem is essentially local in each case. While there are certain fundamental facts applying to the whole problem the ultimate solution must be by the locality affected; hence the need of informing the people in each locality concerning the problems involved. Properly enlightened treatment can only come through the medium of an informed, intelligent public opinion.

Public opinion can be influenced in only two ways. The first comes through the intimate personal contact with the people in their daily use of the service and the treatment accorded by the trainmen. The second approach to the people, and by far the more influential, is through the daily story of the street cars carried in the news columns of the press. It is vitally important that the press publish the facts concerning the electric railways. To this end, facts must be supplied.

We cannot excuse ourselves for neglect to make provisions for seeing newspaper reporters when they call. If the executive is too busy to meet the reporters regularly, he should assign to some responsible member of his organization the duty of doing so.

Editorial expressions are based on statements that first appear in the news columns. The editor reads his own paper and his competitor's. His opinions are formed in the same manner as those of the casual reader, upon the information printed. If this information is false, incomplete, confused or biased, then the opinions that later will find their way into the editorial columns will be fallacious, inadequate, harmful in their effect. It is, therefore, extremely important that there shall be a proper foundation for editorial expression, and this can be built only through the establishment of frank relations between the reporters and those charged with the responsibility of conducting electric railway operation.

When something gets into the papers that is untrue and likely to prove harmful, the best thing to do is to call on the managing editor of the paper and give him the facts. Newspaper men are usually high-grade men, who want to print the truth. To gain their confidence it is necessary to give them your confidence. Mutual respect thereby is established, and it stands both parties in good stead.

There are papers, some of them influential, which, for the sake of appearing to be the champions of the people, adopt, deliberately, a policy of attacking the electric railways. In many instances it is worth while to write statements to them containing the facts, even though to do so may seem to invite further attack. You at least get your side of the case before the readers of the paper, and among their readers there are fair-minded people who can reach fair judgments on the facts as presented.

These remarks apply particularly to moderate-sized properties. The large organizations have learned the wisdom of employing trained men to whom is delegated the duty of keeping the press informed of the company's affairs. Managers of small properties have always found it most advantageous to be on the closest possible terms with the newspaper men.

The Value of Public Utility Information Committees

By James P. Barnes

I HAVE been requested to express to you briefly my opinion as to the value of state public utility information bureaus. The Kentucky Committee on Public Utility Information is conducted under the auspices of the Kentucky Association of Public Utilities. The president of that association, as chairman, with other officers of the association make up the personnel of the committee.

A news service bulletin is compiled and edited by the secretary of the association and issued on the first and fifteenth of each month. This bulletin now has a circulation of nearly 1,000 copies. Two hundred and fifty copies go to Kentucky newspapers, the balance of the circulation going to railway, telephone, light, heat and power companies, public officers, from the Governor and his staff to the aldermen and councilmen of each community. The members of the State House of Representatives and the State Senate are on the mailing list.

Our bulletins are meeting with a cordial reception throughout the State of Kentucky and have brought comments to us from various newspapers throughout the State, such as:

"These are all courteous, bright and timely, and I am sure will go a long way toward bringing about the desired results."

"Your paper is spicy and well gotten up. If you will send me a half dozen copies of each issue I can place them where they will do good."

"Be sure and see that a copy of this bulletin is mailed to me regularly.

Wouldn't miss it for anything. Contains just the kind of reading matter we have been looking for, for some time."

"We think it's great. Have issued instructions to use at least two or three clippings from your service each issue."

After waiting until August, 1922, to make certain that the committee was not going to fall down or get stale with the publicity matter being sent out into the state, a president of a light and ice company way back in the State wrote the following letter to the committee:

"The writer has been greatly inspired by your 'News Service' and feels that as an encouragement to your efforts we owe it to your committee to express to you our unqualified indorsement of each and every issue.

"Your Bulletins are interesting reading matter and filled with facts, and if each of the utilities properly use the information contained in them, it will go far toward a better understanding between the utilities and the public.

"We use an article taken from the Bulletin weekly in our paper and believe it has done much good in view of the fact that our patrons are getting information that is intelligent and we have no trouble whatever from the intelligent and thinking classes."

The foregoing were entirely unsolicited and are indicative of the willingness as well as the eagerness with which the information is received.

Following along the same line, the Advertising Section of the American Electric Railway Association issued a pamphlet entitled "The Truth about Electric Railways." This pamphlet was given wide circulation in Kentucky through the mailing list of our News Service Bulletin.

A pointed illustration of the effect of this work occurred in the operation of our own company. Following the rejection of a compromise ordinance in our fare case, which ordinance was introduced by the Mayor and city attorney following a series of conferences between the city officials and the company executives with the view to withdrawing fare litigation from the Federal Courts, a news writer called the office and asked if "we had noted the bus proposition advanced by several of the councilmen."

This proposal as first announced was to bring to Louisville a nickel bus line to operate, not only on stated thoroughfares but to run wherever throngs accumulate for special events. The councilman who advanced the suggestion said that nineteen out of twenty-four councilmen would vote for such a franchise, and following the granting of a franchise an endeavor would be made to interest capital in the new plan to try it out.

The man who introduced the ordinance announced through an interview that "we believe that before we get through the Louisville Railway Company will be ready to offer a flat 6-cent fare for this year and a 5-cent fare thereafter." The local paper wanted information to combat this and called the secretary of our Committee on Public Utility Information, referred to the pamphlet and asked for that and such other information as was available to write his story combating the "crazy idea of this councilman." Needless to say it was furnished, and furnished promptly.

All during our fare case, which has recently been settled through the passage of an ordinance granting us a 7-cent cash fare with 6-cent tickets when purchased in lots of five, the newspapers of our city have been manifestly fair in their articles commenting on the situation. We have consistently enforced the rule that newspaper men must know all there is to a story in order to write their article intelligently and at the same time in a manner fair to both sides. I have yet to find a case where such confidence has been violated by a newspaper man when information was furnished for information but not for publication.

Give to the local press representatives any information they ask for, and if it is something you do not think would be of value to their readers, tell them so. Explaining this to the news writer in the proper manner will put them in possession of all the facts and they will readily see whether there is any news value to your story or not.

Do not try to force advertising through the editorial room. Use the advertising department; that's what it's for. The news writer for any paper today is just as keen to detect an effort on your part to throw propaganda into the news columns instead of paid advertisements as you can be.

A bulletin of state-wide distribution, which distributes in concise, usable form the facts regarding our industry, fearlessly presenting all the facts as information and not as propaganda, will find a warm reception in all proper quarters, and can but be productive of marked improvement in public understanding of the industry, which means improved public relations

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Public Speaking as a Publicity Medium

By P. S. ARKWRIGHT

IT WAS once said: "In our day the orators hold the people." That was a remark made about twenty-three centuries ago by Aristotle. It is said that many business men, and particularly electric railway men, have a reluctance, and almost an abhorrence, of making what is known as a speech. I will go one step farther—they have a contempt, almost, for anybody else who will do it. They think it is an empty head which makes the most noise, and they have left it to people who know the influence of the spoken word to lead the people into regarding the electric railways as their hereditary enemies.

We cannot run this business on constitutional guarantees, and we cannot do it on the sense of justice of the members of public utility commissions. We cannot run it on injunction suits, or on the decisions of the judges of the courts. We have got to run it on an awakened intelligent, reasonable public sentiment of the people to whom we are furnishing the service and of the people who control the decisions of the public service commissions and of the legislatures, and of the organized city councils and of the vote.

If we know this business we can get up and talk about it. You will not get it over so well with the printed word. In attending various meetings in your community, the ward improvement clubs, the Rotary clubs, the automobile associations, the retail merchants' associations, the advertising clubs, all of them are glad to have representatives of the electric railways come and talk about a subject that interests everybody in the community. They will hear you with great pleasure and soon will find out that you are not a monster hidden away in a back office, robbing them from year to year, but that you are a human being, just like the others. They are beginning to think of the street railway as a personality, and it will do you good, too, because you will get a sympathetic understanding of the people you serve.

There is another very important point which I would like to bring to your attention. That is the reluctance which some men have of giving a talk before their employees. Any man can talk about something he knows about.

Getting Full Advertising Value from a Speech

Another thing—if you want to get the real value of a talk of this kind, from the advertising standpoint, write it out in advance, and give it to the newspapers to be released when you make the address. They will publish your speech with headlines in the paper, while if you sent the same matter as a contributed article they would throw it in the wastebasket. When you make such an address, they regard it as local news. The difficulty about the matter is that if you write the talk out in advance, you may not be able to remember it, and you may not be able to forget it, and the result is that you reach for it and read it to your audience.

Let us overcome our reluctance to tell our story by word of mouth. We usually allow these occasions to go by until a bill is up before the legislature or there is something before the city council, or some one proposes to pass an act lowering our rate of fare. Then we secure a professional orator, and it is too late to accomplish what could be done by the officials of the company if they were prepared to appear before these bodies and make proper pleas. The men in the business should make it a part of their responsibilities to go around and talk to the people and explain this business to them, so that they can lead the people to a sympathetic understanding of their interest in the success of these enterprises, and then we will have right decisions from railroad commissions and votes, too.

Application of Scientific Methods to Industrial Analyses*

The Author Advocates a Threefold Program for Rating Employees, Involving Physical, Psychological, Personal and Historical Tests; Study of Character, and Development of a Personal-History Record

By Francis Lee Dunham, M.D.
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F. L. DUNHAM

ATTEMPTS to apply exact experimental methods to problems of personnel are becoming more and more frequent as the economic value of their results is better understood. A more sympathetic attitude toward human welfare likewise emphasizes their more general use as a means of co-ordinating the interests of employer and employed.

The general purpose of a scientific technic in collecting, classifying and explaining observations as they relate to analyses of industrial personnel appeals directly to business efficiency. Novel methods of testing such important factors as mentality and conduct easily stimulate the imagination of administrators eager to be relieved of the difficulties resulting from irresponsible workmen. Consequently it has not been difficult for pseudo-exponents of "psychology" and "character analysis" to secure a hearing. Inaccurate estimates of the significance of intelligence tests and fantastic notions about personality thus have been frequently foisted upon executive groups inadequately equipped to judge of their efficiency. Sweeping denunciations sometimes have followed, reacting unfavorably upon the business situation and preventing the legitimate growth of the exact method in question.

It is gratifying to find industrial experts keen to take advantage of research and education yet emphasizing the need of caution in deciding what the rational next step should be.

Haphazard Selection of Employees Not Satisfactory

There is a tendency for business executives to assume that research and experiment in problems of personnel are to be avoided as theoretical and to tend toward the adoption of methods based upon "common-sense." Such results are thought to be more "practical." This involves the question of the difference between belief and knowledge, a fundamental economic consideration. Most of our beliefs are the result of personal opinions, based upon superficial judgments often without observational foundation, the product of so-called common-sense. Employees, for example, are generally now chosen by the employment superintendent's "sizing up" method. If the results are poor there are no means of checking up his estimates except by appealing to another person whose guesses have shown good results. Such habits are haphazard and now gradually are being discarded for methods utilizing scientific observation. A rational organization of a bureau for personnel analysis would adopt, as one of its functions, means for examining the special ability possessed by employees long in service whereby they are able to apply "common-sense" methods so advantageously.

In order to arrive at a practical scheme for scientific analysis of personnel in its vocational aspects, industrial enterprises must submit first to the application of a uniform system of tests, the result of experimental research. This is not the place for a detailed description of such a technic. In passing it may be suggested that simplicity should and generally does characterize the best methods whose individual tests include not only laboratory examinations but also social estimates. Such observations may be called social tests and are becoming more available as they are better systematized. The variety of tests need not be extensive nor their application highly involved. It is not so difficult to apply vocational tests as it is adequately to interpret the results. Scientific training and experience here produce the soundest judgments and the most thorough analyses, just as business experience and training react most favorably upon industry.

In applying analytical methods to personnel problems the field of psychology has furnished much valuable data. It should not be forgotten, however, that there are other functional elements more important for use in selecting efficient workmen than mere mental factors. It is futile to adopt the results of intelligence tests as the sole criterion of an individual's social efficiency in industrial or other fields. Reflection shows at once the inadequacy of such a scheme. In order to estimate a man's efficiency we must know more about his personality than is contained in a survey of his mentality. Many of our most faithful workers, responsible parents and exemplary citizens, are persons whose school history and reaction to psychological tests indicate low intellectual levels. On the other hand it is not unusual to meet highly intellectual individuals of unstable character, whose conduct is disorderly and whose responsibility is too insecure to maintain them in positions of trust.

A broader conception of personnel analysis as applied to industry thus is seen to include consideration of three broad fields: that of physical fitness, covered by the general medical examination; that of mental and vocational ability, covered by psychological and trade tests and observations; and that of character, or the attainment of social stability in the organization of one's feelings and appetites.

A number of social observers, notably Trotter and LeBon, have emphasized the consideration of character as the most important asset of a stable society and have urged its scientific study as of greater analytical significance than the study of mental capacity. Whatever its relative importance in our present scheme we are willing to admit the desirability of tests or methods of estimating so-called emotional stability, i.e., the way the individual controls his appetites or natural desires and needs as well as the way he responds to fear, anger and a number of other fundamental biological tendencies with whose intense states the individual frequently unexpectedly is confronted.

A little reflection will convince even the most skeptical that in this field of character we are dealing with the foundations of society. Unfortunately at present we have no well-formulated means of estimating degrees of stability in respect of character. Although a number of technical devices have been suggested and laboratory methods are being tried out, still we are without tests comparable in exactness to those applied in examinations of mentality. But in this predicament we are not left entirely dependent upon "common-sense" methods. There is a means, I believe, too little utilized in our educational, vocational and legal situations dealing with the social adjustment of the individual, viz., the consideration of historical data, i.e., an accurate account of the stock from which the individual has sprung, the trends of his development, his interests and social aptitudes.

History as a Technical Instrument

It is not difficult to formulate a series of questions designed to bring out the individual's inborn characteristics, the path his disposition unconsciously has followed and the control he has been able to develop over his appetites and feelings, i.e., how he has been able to get along with his fellows. Personal history of this nature need not involve publicity of intimate details nor even an attempt to follow the facts more closely than is required to bring out general tendencies. Biological and social data always have been employed to some extent in answering such superficial questions as involve honesty, reliability, cheerfulness, etc. Scientifically formulated plans designed to utilize personal history in interpreting conduct already are employed by a number of educational and judicial agencies. One of the most successful of these attempts has been in operation for the past three years at Harvard University. The Judge Baker Foundation of Boston, dealing with juvenile problems in conduct, is another agency making extensive use of this method of securing data for character analysis.

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*Abstract of contribution to discussion of report of committee on personnel and training of transportation department employees, at convention of American Electric Railway Transportation & Traffic Association, Chicago, Ill., Oct. 2-5, 1922.

Summarized, the preceding suggestions recommend as a practical scheme for the use of transportation departments in the railway industry inclusion of the following in its plan of organization:

1. The formulation of a concise series of tests—physical, psychological, personal and historical—to be applied experimentally and uniformly in a number of localities, the results to be studied and embodied in an annual report. When a practical plan emerges from this experimental data it may be used as an educational method toward improving transportation personnel generally.
2. The more intensive study of character as a criterion of economic efficiency.
3. The development of a practical personal-history record as an aid to the interpretation and prediction of conduct reaction-types.

Economics of Operation of Interurban Lines*

The Writer Lays Stress on the Necessity of Cost Analysis and Points Out Various Ways by Which Economical Operation Can Be Secured, as by Schedule Revision

By C. E. Morgan
General Manager
Brooklyn City Railroad

C. E. MORGAN

THE failure of many business concerns can be traced almost directly to their negligence in keeping accurate account of their production expenditures. This omission either causes them to sell their merchandise at a loss instead of a profit or makes them unable to place a proper price upon the article so as to compete successfully with similar merchandise. Interurban roads cannot arbitrarily place a price on their commodity, transportation, as their rates of fare are fixed by franchise or by regulatory bodies, but it is their duty, through their officials, to scrutinize costs of operation very carefully with the view of rendering a service for which there is a demand. Statistics covering results of previous operation should be carefully weighed by those in charge, and these statistics should be up to the minute, for no matter how ample the detail or how well prepared the value of the data depends entirely upon its age. Further, when this information is available, it should be distributed promptly among those who are responsible, particularly the superintendent, trainmasters and other supervising officials. Each department head and his immediate subordinates should be conversant with the costs of operating any unit under their charge, as well as with general information as to the cost of operating other departments and other divisions of the system as a whole. We should know the cost of operating each unit, whether it be a motor passenger car or trailer, a freight motor or other type of equipment. Also, we should know the cost of each item in detail that enters into the maintenance and operation of the interurban line, not only for the system as a whole but by division, in the case of some of the larger properties.

When the wheels of the cars are stopped, they have no earning power, and if they are running when not needed they are wasting money. This is an instance in which a close study of operating results will show wherein a reduction in car mileage can be made.

All schedules should be laid out graphically, showing not merely the movement of the car or train, in accordance with the schedule which is usually termed revenue car-miles, but showing also all the time of the crews, including reporting, layover and time allowances of every kind. Careful study of these charts will, in many cases, result in a large reduction in platform time, as well as in the number of cars used to provide the service.

Many officials believe it wise to maintain a uniform leaving time from some terminal. This is very expensive if a line is too long or too short for a certain number of cars. It is true that uniformity of headway is to be desired, but it is then a question whether the net result is better with such uniform leaving time at the initial station with the use of a somewhat staggered leaving time better to utilize the time of the crews and cars.

When two or more divisions are operated from the same terminal or a connecting terminal, careful consideration should be given to the question whether the cars of one division should not be operated through over the other division, eliminating the terminal layover; or whether the system should be studied as a whole, routing the cars or trains where they will make the maximum mileage with the least platform expense. In laying out schedules, the mechanical and power departments should be borne in mind. Cars scheduled for inspection should be scheduled to the point of inspection, eliminating dead mileage. It may be advisable to stagger leaving times at terminals in order to save power and to secure better movements at or near meeting points. Careful consideration should be given to the question of running speed in operating schedules, as the cost of operation mounts rapidly with each mile per hour increase in speed. By consolidating divisions, savings can be made in supervisory and train dispatching forces, these savings depending, of course, on local conditions.

Before making changes in operating schedules, a careful survey of the passenger traffic should be made by taking cross section counts showing passengers and seats, which should be plotted graphically. From such calculations the various loading percentages in either direction on the entire line can be readily determined. These charts will, in many cases, show where short line service may be operated. This may involve the installation of track facilities to permit turning of equipment, the cost of which should be compared with the cost of operating additional car mileage due to the absence of such facilities.

Few interurban roads operate through densely settled territory. This results in heavy loading at the maximum point of travel and very light loading at other points on the line. By taking a cross section check, this will be apparent, and while it has been the practice to operate on an hourly headway, it will no doubt be found that many of such cars or trains can be eliminated, depending somewhat on local conditions, particularly competition. So, also, many of these hourly trains, particularly in the morning and evening, are run in trains or sections consisting of two or more cars, while with bus competition better results might be obtained by splitting up these trains and running them more frequently. At the same time this would result in a more uniform load factor in the power house.

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*Abstract of address presented as part of the discussion during "Interurban Hour" before the American Electric Railway Transportation & Traffic Association, Chicago, Ill., Oct. 2-5, 1922.

These matters bring home to the operator the necessity of scientifically analyzing all elements entering into the operation. Experience has shown that as to these costs, be they on a car-mile, car-hour, or seat-mile or ton-mile basis, the best results can be obtained if the operating officials work up this detail with the aid of the accountants so as to make it available within a few hours after the operation instead of days and weeks after. These data should be kept not only in comparative figures, but should be plotted graphically in connection with expenses.

When the cost per car-mile of operation is determined, these figures can be readily applied to the unit in question, and when compared with the earnings of such unit the answer is obvious. With companies operating several types of equipment and two or more divisions, the task of ascertaining which is putting the red ink on the balance sheet is not difficult and thus the management is enabled to stop the loss.

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California Interurbans and the Bus*

Competitive Situation Gradually Clearing Up, but Much Is Yet to Be Accomplished on Account of Specially Favorable Conditions for Bus Operation in California

By D. W. Pontius
Vice-President and General Manager
Pacific Electric Railway,
Los Angeles, Calif.

D. W. PONTIUS

CALIFORNIA is the most fertile field for common carrier bus and truck operators, and unquestionably there are more of such operators in our state than in any other state in the Union. The reason for this intensive competition is due primarily to: (1) Climatic conditions; (2) favorable legislation; (3) an excellent system of highways, and (4) no tax for use of highways.

There are 6,000 miles of paved highways in California that are rapidly being crushed to pieces by heavily loaded common carrier buses and trucks —assisted of course by heavily loaded trucks in private use. The seriousness of the situation may best be explained by calling your attention to the fact that the State Highway Commission is now contemplating a $60,000,000 bond issue for the purpose of repairing the highways of the state.

Both state and county highway commissions have long appreciated the gravity of the situation, and have suggested and even attempted from time to time to have passed reasonable legislation to control the common carrier buses and trucks. To date their efforts in this direction have not been successful to any appreciable extent, due to the political power of the California motor bus and truck organizations.

Every owner or driver of a bus comes daily in contact with the public and politicians of the state, and seldom fails to further his cause. During the meeting of the last Legislature the bus and truck lobby at Sacramento was so large that it made the railroad lobby look like the German army after the boys from the United States went over the top in the recent war.

It will be interesting to you to know the effect the buses and trucks have on the revenue of the Pacific Electric.

There are now 380 buses and trucks operating directly in competition with the Pacific Electric, taking from the railway company an annual revenue of approximately $3,325,000.

Based upon figures obtained recently from the State Railroad Commission the total revenue of all commercial buses and trucks operating in the state amounts to $17,000,000 annually, and if this traffic had been handled by the railways, the taxes to the state on the revenue would have amounted to $892,500, while the taxes paid by the buses and trucks did not exceed 1 per cent, or $170,000.

LONG BEACH BUSES LEGITIMATE

The competition is not limited to interurban traffic. Local buses operate in several cities served by the Pacific Electric in direct competition with the railway company, and in many cases under exasperating conditions. In Long Beach, a city of 70,000 population, there are two bus companies rendering local service within the city for a 5-cent fare. These two companies operate seventy-seven buses, but are not permitted by the city of Long Beach to parallel the Pacific Electric street car lines. They are operated on paralleling streets in most instances, two or more blocks away from the street car line. This is competition of which the railway company cannot justly complain, due to the fact that the street car lines were not extended as the city increased in population and some kind of transportation service was necessary. The reason that the electric lines were not extended in Long Beach just previous to the war is the same as that which prevented most of the electric railways in the United States from extending their lines: Impossibility of profitable operation on a 5-cent fare, and at that time there seemed to be no chance of obtaining a higher fare.

However, the situation is entirely different in the city of Pasadena, where the city's Board of Directors deliberately granted applications for individual bus operators to operate on the same streets as the street car lines. These individually-owned buses travel directly in front of the cars, picking up passengers that would use the cars if it were not for the buses. The result of this competition has been disastrous. If the buses operated in Pasadena were required to use the streets over which street cars are not operated, the general opinion is that they could not exist.

In Pasadena at the present time railway trackage must be renewed, street car lines must be extended, and bus lines established, if the city is to be properly provided with transportation. There is not enough traffic to justify two classes of transportation on the same streets. The railway company stands ready to make the necessary expenditure but we are determined that unless relieved from paralleling bus competition the tracks that should be rebuilt will not be renewed, and further application will be made to abandon such tracks.

A somewhat similar condition exists in the Santa Monica Bay district, where we are working with the commissioners of Santa Monica and Venice to establish a comprehensive rail and bus service for that district, which has a total population of 35,000. It now looks favorable for this district to accept the proposition made by the railway company.

The Pacific Electric is now operating

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*Abstract of talk before American Electric Railway Transportation & Traffic Association, part of "Interurban Hour," Chicago, Ill., Oct. 2-5, 1922.

local bus service as feeders for its electric lines in three important cities served, and four more cities are being considered for bus line feeder service. If our propositions in Pasadena and Santa Monica are acted upon favorably, we will have sixty buses in service. The first buses placed in operation cost approximately $4,500 each, but it has been determined that a higher grade bus, costing approximately $8,000, will prove to be more economical.

These buses are not operated directly by the railway company, but by a subsidiary company—the Pacific Electric Land Company. The particular reason for this is to place the buses as nearly as possible on the same taxation basis as the individually owned buses operated in competition with the Pacific Electric. In other words, taxes are paid on the valuation of the buses instead of on a revenue basis of 5¼ cents of each dollar collected, which is the present plan of taxing public service corporations in California.

High-Class Equipment Used

The city of Los Angeles, in common with many other municipalities throughout the United States, has had its experience with the jitney bus, and voted it out. The motor stage lines in and out of Los Angeles are probably more extensively operated than out of any other city in the United States. There are numerous large companies, operating a high class of equipment, and who have pretentious stations in Los Angeles and in many of the other cities which they serve. These companies operate to many points which have long been served by the railway, and of course it is the interurban service which makes the most serious inroads on our revenue. One company alone, operating out of Los Angeles, uses more than 700 miles of highway.

These bus lines were started before the law required them to obtain a "certificate of public convenience and necessity" from the State Railroad Commission, and when placed under the commission, they were permitted by the commission to continue operations.

In combating this competition we have used every fair and legitimate method. We have shown that it is manifestly unfair to penalize the railway company with a tax burden many times greater than is exacted from the common-carrier bus lines.

Articles have gone to the press through our publicity bureau.

Pamphlets have been distributed to the public.

In public addresses our officials have brought out these facts forcibly.

Magazines have been stimulated to publish articles on the subject, and our employees are educated through their company magazine.

Every application to the State Railroad Commission for permit to operate buses in competition with our lines has been vigorously protested before the commission, and no case has been lost since the commission has had jurisdiction.

Recently employees conducted a campaign in their local communities that created considerable favorable public interest and publicity.

We now see an awakening of the public mind on this subject. The people who in the end must pay the bill are beginning to rally to the support of legislation favoring adequate taxation of carriers who commercialize the highways. The time is not far distant, in my judgment, when common carrier buses and trucks in California will pay, at least to a reasonable extent, for the wear and tear they do to the highways, and pay a tax to the state that will be at least the same as other transportation lines must pay for the privilege of doing business. Once on such a basis there is little to fear as regards the future stability of electric railways.

At a recent hearing before the California Railroad Commission, which resulted in a readjustment of, and in some cases an increase in, fares, the chief engineer of the commission testified that "if it was not for the paralleling bus competition there would be no reason for an increase in Pacific Electric fares."

Common carrier bus lines in every state in the Union should be under the State Railroad Commission or Public Service Commission, as this is the only way that railways can be protected against paralleling bus competition.

With the development of California continuing in unabating vigor, the lack of extensions of electric railways throughout the state is causing deep concern. The California State Realty Board, appreciating the gravity of the situation, has started a movement to put before the voters of the state the question of vesting greater regulatory powers in the State Railroad Commission. In California many cities have stringent franchises, and other municipal ordinances, which have hampered the extension of electric lines, thus causing a lack of development of the suburban districts, and many public-spirited organizations are rallying to the support of the movement. Commercial bus and truck carriers would also be affected and co-ordinated with other transportation mediums should the amendment which goes before the voters of California in November be adopted. The success of the movement seems problematical; in any event, as a result of the campaign a considerable amount of favorable publicity is being given to the problems of the electric railway industry throughout the state.

The Financial Outlook Is Improving

With the adjustment of the fares of the Pacific Electric in January of this year, the financial outlook of the company is brighter than at any time in its history, and we are looking to the future with confidence that our problems will be less burdensome. A very extensive summer program of rehabilitating tracks and equipment is being carried out.

In the face of a tremendous growth, southern California has had comparatively no electric railway extensions in late years. The population of Los Angeles has increased from 580,000 in 1917 to 810,000 in 1922, and it is now up to the railways to make extensions or install bus lines to handle the growing traffic.

The Los Angeles Railway, operating 385 miles of double-track railway, handles the bulk of the local traffic in Los Angeles and will, within the next few months, install numerous feeder bus lines or trackless trolleys, whichever the management considers the most desirable.

The Pacific Electric will install bus feeder lines.

Figuring the requirements of the two lines, there is now being installed, or under consideration for installation, a total of nineteen feeder bus lines in and around Los Angeles.

The Pacific Electric is extending some lines, both local and interurban; construction will be commenced at once on a tunnel in Los Angeles costing approximately $3,000,000; fifty steel cars for the Hollywood service are being delivered at the rate of five a week and placed in service, and upon completion of the tunnel will be operated in two and three car trains.

These improvements, together with 200 freight cars ordered for December delivery, represent a total expenditure of $5,250,000 now under way.

The Bus Is a Permanent Factor

These things are cited to show you that we are not holding post-mortems over commercial bus and truck competition, nor over any of our many other difficulties in the past. On the contrary, it is the aim of the railway to keep pace with the fastest growing city and district in the world. Pardon my seeming egotism, but you have been invited to hold your next convention in California, which will give you an opportunity to come out and see for yourself, then you will believe.

In conclusion, I want to say that it is my opinion that bus transportation will never successfully supplant the electric railways; it is here to stay in one form or another. There is no doubt that in many instances, such as feeders, and when other forms of transportation are not provided, for service to partially developed sections, the bus can render a useful service, both to the public and to the electric railways.

In the end, with the present favorable trend of public opinion toward reasonable regulation for common carrier automobile buses and trucks, and the field so definitely defined, the present unfair competition will be greatly restricted. The problem of the electric railway is not to endeavor to put the buses and trucks out of business, but to endeavor to see that their service is rendered in districts not adequately served by rail transportation, and to forestall the uneconomic, unfair, and in some cases cut-throat, paralleling of railways.

The Turnstile Car on the New York State Railways*

Standard Cars Were Equipped with Turnstiles at the Rear or Center Entrance and the Front Was Used as an Exit—Safety Devices Are Used and Include Several New Features

By J. E. Duffy
and Harrison S. Sweet
Respectively General Superintendent Utica and Syracuse Lines and Engineer of Equipment New York State Railways

THE New York State Railways, on its Utica and Syracuse lines, has been confronted during recent years with an increased wage scale and high prices for the materials and in maintenance. While practicing rigid economy, the management found that this was not enough, and as the one-man car had been put in operation by many roads which were able to finance the purchase of new cars, our company felt that this type of operation might be accomplished with the same cars that were in use on the property.

In March, 1921, we were convinced that this type of operation was practical in our larger cities, so in April one-man cars were placed in operation on some of the lines in Syracuse using the existing standard double-truck rear-entrance front-exit cars and front-entrance center-exit cars of the Peter Witt type. The rear or center doors were locked, the passenger entering and leaving the car by the front doors. It was soon apparent that the use of the same doors for entrance and exit was slowing up service and causing congestion. Our mechanical department suggested that a turnstile be placed on the rear platform to allow passengers to enter but not to leave the car at the rear. Our first experiments along this line showed that the car could handle passengers with less delay than our other one-man cars. The car also will load very compactly during the rush, for the boarding passengers go forward of their own accord as they know the exit is at front. These cars gave such good results that we continued and extended this operation until we have at the present time cars of this type in service in Syracuse and Utica.

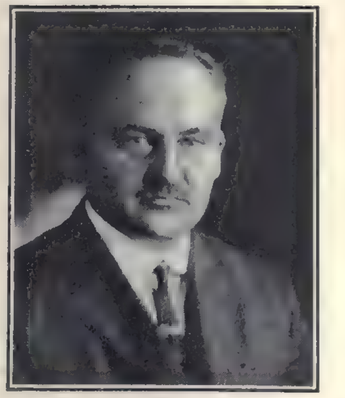
The following are the essential features of this car: First, there is the turnstile in rear end. Then a mirror projects from the front vestibule body post and gives the operator a complete view of the outside of the car and the rear step. Finally, the passengers deposit their fare in the fare box upon leaving the car.

J. E. DUFFY

The first cars were equipped with a very crude four-arm pipe turnstile which took up most of the rear vestibule and was built with the idea of providing a positive barrier against the use of the rear door as an exit. We gradually lowered the stile and changed its form until, at present, we have a three-arm wooden stile with only one row of arms. The stile serves as a guide for the public and allows plenty of room for passengers with baggage and small children.

INCREASED SEATING CAPACITY

The use of the three-arm stile made it possible to locate it in a different place and so to increase the seating capacity of the car. In fact, the car seats four or five more than when operated as a two-man car. Where loading or transfer conditions make it imperative to operate "Pay as you enter," the operation can be reversed and the turnstile used as an exit, or if the car is "Pay as you leave" at a heavy unloading point where there are no boarding passengers, the operator can release the turnstile and the street man collects fares at the rear door, thus discharging passengers from both ends. We have not found it necessary to do this.


H. S. SWEET

SAFETY FEATURES OF THE CONTROL

A safety control is used on this car which possesses several novel features. The dead-man control is from the power controller handle and is standard practice. That is, if the operator's hand is removed from the controller handle without his first applying the brakes, the circuit breaker is knocked out and the emergency brakes are applied, the track is sanded, the doors are balanced and the turnstile is released so as to turn freely, thereby allowing the rear door to be used as an exit. If the hand is removed from the controller handle after the brakes are applied, none of the above operations occurs but the doors open. Then when the hand is restored to the controller handle, the doors close.

This control of doors from the power controller handle effectively interlocks them with the brakes. They must be on before the controller handle is released or there is an emergency application of brakes. This insures that the brakes are applied before the doors are opened. Vice versa, the controller handle has to be pressed down before the brakes are released, thus insuring that the doors close when the brakes are released.

The selective operation of the doors which is necessary on our turnstile cars is done by connecting up the doors so that both front and rear doors open on the removal of the hand from the controller handle, but only the front closes when the handle is pressed down, the rear closing on release of the brakes. It is usually necessary to close the front door first so as to give an unobstructed view of the rear door through the mirror. Of course, both front and rear doors are provided with separate cutout valves located in front of the motorman. With this door control the operator gets selective control of the doors, in most cases without removing his hands from the controller or brake valve.

Another feature of the control is that after an emergency application of the brakes the doors do not balance instantaneously, but only after a time interval sufficient for the car to come to a stop. Low air pressure automatically applies the brakes when it falls below a fixed amount, for the same valve which keeps the air tanks from leaking off through any rupture that might occur to the piping will itself automatically apply the brakes if the air pressure falls below a predetermined pressure. This valve also insures that the car cannot be put into service without a safe working pressure, for when the compressor is started the brakes go on and continue to build up with the system until a predetermined pressure is reached, then they can be released. This has the odd advantage that it will detect a badly leaking brake cylinder gasket, for if the gasket leaks faster than the compressor can pump, the brakes cannot be released by the regular method.

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*Abstract of paper read at convention of American Electric Railway Transportation & Traffic Association, Chicago, Ill., Oct. 2 to 5, 1922.

In equipping a car with the above safety control, the same brake valve and arrangement can be used that are on the car, the additional equipment required being a standard emergency valve with sanding feature, protecting valve, controller dead-man valve, circuit-breaker, knockout cylinder, small sanding reservoir, check valves, etc.

TURNSTILE CAR "FILLS THE BILL"

We have now operated cars of this type in Syracuse and Utica for a year and feel that they "fill the bill" in every particular. At busy points, after passengers who have finished their journey have left the car, both doors are used for loading in order to facilitate movements through the busiest parts of our cities. This is possible because with turnstile cars all fares are paid when passengers leave. Operators on this type of car make change, sell tickets, issue transfers, etc.

Seventy-five per cent or more of our platform force are qualified one-man car operators and all new men are hired as motormen, receiving the regular course of instruction before being placed on cars and, after the expiration of thirty days are given further instruction on one-man cars, then, if found satisfactory, they are placed on the one-man car operators' list. When turnstile cars were first placed in operation it was necessary to instruct men who had been conductors in the duties of motormen and vice versa. It is gratifying to state that but a very small number were unable to qualify and these men were taken care of in other positions where possible.

All cars operated carry signs on the front designating "Rear entrance" or "Center entrance" as the case may be. This we find is important where more than one type is used.

INCREASE IN RUNNING TIME

Extensive check in Syracuse showed that the turnstile one-man car consumes 2.6 seconds per passenger interchange against 1.9 seconds for the two-man cars. These checks were made in January, 1922, after the turnstile car had been operating only a few months. Some of our recent one-man turnstile car checks are showing an average of 2.4 to 2.5 seconds per passenger interchange. Using these figures as a comparison, it is interesting theoretically to check the difference in schedule speed between one and two-man operation. Tests in Syracuse have shown that the total running time per trip for two-man cars was distributed as follows, 10.3 per cent for handling passengers, 3.6 per cent delay due to vehicles, etc., 86.1 per cent actual running time. These are actual averages for the city of Syracuse.

The turnstile one-man car increases this to 13.6 per cent of the time used in handling passengers as the ratio of 2.5 to 1.9. Therefore, the total time per trip is increased only 3.3 per cent. This can usually be taken care of by faster acceleration or less layover time.

Relations of Engineer and Accountant in Public Utility Development*

Reasons for Co-operation Between the Engineering and Accounting Departments Are Stated, Together with Practical Suggestions as to How Co-operation Can Be Brought About—Reasons for Previous Lack in This Direction Are Outlined

By Edwin D. Dreyfus
Engineer West Penn Railways
Pittsburgh, Pa.

E. D. DREYFUS

IN DEALING with the subject of the relationship of the accounting and engineering departments, we must keep in mind the places where their respective work dovetails. Accounting engages the engineering department when money is being devoted to new property and extensions, and also when it is being spent in rendering the service for which the utility is designed.

The two divisions of engineering are, in some companies, separate and distinct, but the accounting department remains a unit and logically provides for both through its proper capital account and expense accounts. Even when one engineering organization handles both operation and construction, due apportionment of the expenditure is, or should be, reported to the accounting department.

The contact between the accounting and engineering departments is as broad as the business itself, and the accounting department may prove to be most helpful to the engineering department, in any effort on the latter's part to secure low construction and operating costs, through the furnishing of the necessary details of cost directly allocated to the work under consideration.

Among the drawbacks that have operated against making any accurate and searching analysis of the business in the past were the respective positions assumed by the two departments. Sometimes this took on the form of opposition or utter disregard, with occasionally a sprinkle of toleration.

The nature of the training of the men who constitute the two departments has had much to do with this condition. The science of accounting is an exact art. It is positive in its application, and those who pursue such work are liable to become categorical in their attitude through environment and habit. On the other hand, engineering is an applied science. In dealing with the laws of nature, the engineer may employ certain factors of safety and make other allowances in order that the structure and equipment will be operative and durable. Hence engineering is a profession in which experience and judgment figure prominently. Since the engineer's judgment is so important within his own specific realm, he may become strongly opinionated, and therefore attach more value to his own estimate than to book records that have been prepared by the accountant. As a consequence friction often occurs, which produces no benefit whatever.

In consequence of the fundamental training of the two classes of men—distinctly opposite in character—it is not at all surprising that the two departments may sometimes be at variance on points bearing upon their joint duties. Where such conditions exist, it is important to change the attitude of both the accountant and the engineer. A little thought given by each to the requisites of the other fellow's work inevitably develops a sympathetic understanding.

A FEW CONCRETE SUGGESTIONS

The practical application of the idea of co-operation may be accomplished through any or all of the following:

1. Joint meetings and discussions to elucidate in a rudimentary way the procedure necessary successfully to carry out the work of each department.

2. Preparation of simple notes for exchange, describing the elements that must be cared for in fulfilling the functions of the two departments.

3. Provision of diagrams and such other illustrations as will show graphically the true nature of the other department's work. These will visualize, in the case of the engineering department, how the equipment is arranged in order to provide for the service, and how the operating force is organized to maintain the service. Furthermore the

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*Abstract of paper read at annual convention of American Electric Railway Engineering Association and American Electric Railway Accountants' Association, Chicago, Ill., Oct. 2 to 5, 1922.

significance of the different classes of service or charges obtaining can be graphically illustrated. For the accounting department it is possible to show the manner in which the information and costs are routed in order that all expenses are properly distributed and placed on record and afterward recast for the various purposes of the business.

The educational benefits derived from the meetings of the company sections, or special staff and interdepartment conferences of the companies, are of the character covered by the first proposition. In the case of the second we find the companies' own classification of accounts often supplemented by explanatory notes which guide the construction and operating departments in reporting on work done.

Although there never has been a time when it was not desirable to co-ordinate the work of the accounting and engineering departments, it is important to do so now because, while public service regulation is becoming more rational, it is nevertheless exacting greater proof of the facts. Valuations not already undertaken must some day be made, and careful and consistent records provide a firm foundation for them. Expense must be distributed to the proper accounts in conformity with established rules. Depreciation must be taken care of, as it is a part of the law, and the reserves to be set up are to be based upon the proved needs of the business. More statistical information is required. And, further, cost accounting could advantageously be carried out in much detail.

SOME TECHNICALITIES OF ACCOUNTING THAT NEED ATTENTION

There are various property values that might be mentioned, viz., market value, book value, investment value, value for taxation purposes and value for rate-making purposes. Eventually one value of the public utility will become predominant for all purposes, and that is the much discussed fair value regarding which we will find a wide divergence of opinion among engineers, economists, lawyers, the commissions and our courts. After all differences are ultimately rationalized and common principles of valuation universally adopted the accountants' records will then become controlling for rate regulation and likewise, in an equally strict sense, in all business matters of the utility corporation.

To accomplish this end, a complete system of authorizations, requisitions and work orders must be enforced where they have not already been put into effect, or where they have been treated in a perfunctory way. The work covered must be set forth very clearly, and sufficiently described by the engineering department so that the records will always be self-explanatory and, in addition, accurate when completed in the accounting department. As the work progresses, the engineering department must exercise particular care that all charges are properly designated and assigned to the account to which they belong. When the charges are received by the accounting department, there must be no question as to their being placed against the proper authorization and accounts, and after the work is completed it must be certain that the cost will be shown in full. The diagrams and descriptions of the work prepared by the engineering department, above referred to, will enable the accounting department to apply somewhat of a check as to the correct distribution of the various charges, some of which may not have been clearly assigned.

The accountant has the duty, also, of properly allocating all overhead expense and entering the due portion against each construction job. Part of this overhead may be best determined by a discussion of the details between the accounting and the engineering departments.

Extensions and improvements should, of course, absorb the greater part of the attention of the accountant and engineer. However, as the property grows, certain equipment becomes obsolete and is abandoned for its inadequacy and lack of utility when it still possesses serviceability. The disposition of the accounting in such instances requires special treatment, for the history of the case must dictate what corresponding value, if any, should be written off the books. It also depends upon whether the business has permitted the amortization of such equipment before it is retired or else it is to be carried temporarily as a deferred charge to be gradually wiped out through future earnings. Or, it may be necessary to capitalize the account as a developmental expense of the business, if it can be proved that this is the most equitable way under the particular circumstances.

Figuratively, an epidemic of cost and efficiency systems seized the industries, chiefly the manufacturing branch, several years ago. Leading manufacturers felt the necessity for more definite cost analyses in order to ascertain wherein competition could be best met, and also which products really produced the greatest net profits. While the public utility is on an entirely different plane from that of the producers of equipment and commodities, nevertheless it is required to differentiate among the various classes of service it renders.

In the first place, we must have cost accounting to establish our construction expenditures in a precise way. Not only do commissions require it but the bankers who finance utilities are beginning to insist upon an adequate record being kept of all disbursements of funds.

Unit costs are derived when the cost-accounting system is complete. These unit costs will afford an opportunity for comparisons as to relative efficiency and economy with which the work has been done, and also provide a more positive guide for future estimates.

Presently the arriving at the cost of rendering various kinds of service in a more methodical way will become quite general. Although every utility at this time has means of testing the adequacy of its various rates, fares and charges, there is room for improvement.

The facts that cost accounting will display will enable the utility to carry on its business with greater certainty than heretofore. It should also be in a stronger position absolutely to defend whatever rules, rates and system of charges it has or may put into effect. Results as here indicated are only possible through the earnest efforts of the accountant and engineer combined.

Every business which has to deal with man-made physical property must make provisions for the restoration of equipment and structures that are subject to wear and tear, age and the elements, and likewise to accidents and unforeseen happenings. Whatever the plan adopted it should be such as will clearly indicate to the accountant and engineer that the necessities of the business will be provided for, without, however, building up such reserves as may check the growth of the business or cause too great a contribution from present patrons.

The engineer and accountant should jointly work out some feasible plan of taking care of reserves, based upon sound experience of the business.

BUILDING UP A SPIRIT OF CO-OPERATION

Closer contact between the accountant and the engineer has come about through state and federal regulation and from intensive development of the business. The accountant should pay just enough attention to engineering to understand the principles of valuation and the general construction and operating features of the business. The engineer, however, should appreciate the essential elements of accounting, and those in more important positions should even require a reasonable understanding of the balance sheet so often considered "elusive." Admittedly the line must be drawn somewhere, but the limitations in each case must rest with the judgment of those who direct the utilities' affairs.

In building up an organization, with the attendant selection of employees for both engineering and accounting work, it is desirable that the qualifications of the applicants be broad enough to fit them for their particular responsibilities not only with reference to their immediate duties but also as regards other departments. Many employees already are conversant with both engineering and accounting, but the developing of more men of such qualifications should be encouraged. This is bound to enhance both the efficiency and the integrity of the organization.

Co-ordination has existed to some degree in every organization. It is to an organization what spirit is to the animate being. However good the different departments of an organization may be within themselves, without the essential spirit of co-operation with allied departments the strength of the organization is impaired.

Light-Weight Interurban Cars[*]

By J. P. Pope
General Manager
Kentucky Traction & Terminal Company
Lexington, Ky.

How a New Light One-Man Interurban Car Reduced the Energy Consumption from 33 to 47.8 per Cent, Eliminated Jitney Competition and Greatly Increased the Net Earnings

PRIOR to June, 1921, we had, from time to time, been giving a certain amount of study to the betterment of our interurban system. Shortly thereafter we started to investigate on the ground the existing types of cars of the Cincinnati, Lawrenceburg & Aurora Electric Street Railway and the Cincinnati, Milford & Blanchester Traction Company, both of these properties running out of Cincinnati, Ohio. A little later we investigated the system of the Union Traction Company of Nashville, Tenn., which operates a similar type of car.

In August, 1921, serious bus competition began to appear on our interurban lines and had reached very destructive proportions before we were able to close the order for ten of the present type of "Lexington" light-weight, one-man cars, which are a further development of the cars of the three roads mentioned. The company's aim in the purchase of these cars was fourfold, namely:

1. Maximum comfort to the car rider.
2. The interior of the cars must be attractive to the traveling public by the elimination of objectionable and useless interior fixtures.
3. The operation of the car must be made as easy and convenient for the motorman as possible.
4. The finish must impress the public with its taste and simplicity.

The cars are 40 ft. 3 in. over all and weigh completely equipped 25,100 lb.[†] and have a free running speed at 600 volts of about 36 m.p.h.

The data shown in Table I on the cars may be of interest.

On Dec. 1, 1921, about two and a half months before we received the first of the new cars, we began the education of the public and our employees to the pay-as-you-enter plan by installing a new type register just inside the rear door on all of our old interurban type cars. While our conductors were good motormen, our motormen were inexperienced in fare collection and therefore at frequent intervals we reversed their positions, with the result that they, as well as the public, soon became familiar with the new pay-as-you-enter system.

We had serious bus competition on the line on which this car was to run, and part of the general campaign for meeting this competition was a reduction in the fare rate, and a further reduction in the ticket over the fare rate, also put into effect on Dec. 1, and was made possible by the new cars.

TABLE I—DIMENSIONS OF LIGHT WEIGHT INTERURBAN CAR

Length over all	40 ft. 3 in.
Length of platform over bumper	Front 4 ft. 9 in. rear 5 ft. 0 in
Width over all	8 ft. 6¾ in.
Rail to top of trolley boards	10ft. 4-3/16 in.
Rail to bottom of side sill	27-11/16 in.
Rail to step	16 in.
Step to platform	14 in.
Ramp, platform to car floor	2¼ in.
Post centers	33 in.
Clear height inside	7 ft. 3 in.
Seating capacity	44
Width of seats	37 in.
Width of aisle	26 in
Passenger door opening	36 in.
Merchandise door opening	42 in.
Trucks	Cincinnati arch bar
Truck centers	21 ft.
Truck wheelbase	5 ft.
Wheels	26 in. rolled steel 3 in. tread
Motor equipment	Four G.E. No. 264—25 hp. each
Controller	G.E.K-35, single end
Compressor	G.E. CP-27
Headlight	500-watt incandescent with G.E. Co. resistance.
Small storage battery furnishing light for the emergency lamp, markers and tail lights.	
Seat spacing, center to center	33 in.

The former rate was 3.6 cents per mile either for cash or ticket. The new cash rate was fixed at 3.25 cents per mile, but to speed up loading, assist the car operator by avoiding congestion at terminals where a large number of people usually board the car, and further to merchandise the service, the ticket rate was made 3 cents per mile, with a further reduction of 5 cents on round-trip tickets to terminal points. Monthly commutation books and school books are sold at a reduction over the former rates. In addition to the above, a new twenty-four trip book was put out, good for anyone.

Still further to merchandise the service, on Jan. 22, 1922, a new hourly schedule was put into effect, with the old cars, in place of the former hour and a half service.

With the one-man operation, much time and trouble would have been involved in backing in and out of meeting points, as the sidings on the interurban divisions were all single ended. It was therefore decided to make all regular meeting points through sidings with spring switches, arranged so that cars would pass to the left, for convenience of the operators so they could step out of the door of one car into the other car. A 7 m.p.h. slow order was put in our rules to avoid splitting these spring switches. With the rapid braking and quick acceleration of the new cars, the time lost at switches is not appreciable.

On Feb. 11, 1922, we put the first of the new cars into service, the operators having received only a few days education in the safety features. By this time the passengers and our employees were familiar with the pay-as-you-enter plan, and there was practically no trouble or confusion.

TABLE II—GROSS REVENUE AND NET OPERATING REVENUE 1921-1922 COMPARED WITH CORRESPONDING PERIOD 1920-1921

	Gross Revenue	Net Operating Revenue
August, 1921	26.8 per cent decrease	42.5 per cent decrease
September, 1921	40.3 per cent decrease	67.8 per cent decrease
October, 1921	37.1 per cent decrease	59.7 per cent decrease
November, 1921	37.9 per cent decrease	66.0 per cent decrease
December, 1921	40.8 per cent decrease	75.3 per cent decrease
January, 1922	31.8 per cent decrease	69.1 per cent decrease
February, 1922	20.3 per cent decrease	39.5 per cent decrease
March, 1922	16.7 per cent decrease	23.4 per cent decrease
April, 1922	4.3 per cent decrease	6.9 per cent increase
May, 1922	12.7 per cent increase	42.6 per cent increase
June, 1922	8.3 per cent increase	17.7 per cent increase
July, 1922	7.2 per cent increase	33.3 per cent increase

TABLE III—COMPARISON OF PASSENGER STATISTICS FOR THREE DIFFERENT MONTHS

	August, 1921	August, 1920	Per Cent Decrease
Gross earnings per car-mile	$0.461	$0.620	$25.6
Gross earnings per car-hour	9.10	12.15	25.2
Expenses per car-mile	0.330	0.395	16.4
Expenses per car-hour	6.52	7.80	16.4
Net earnings per car-mile	0.131	0 225	11.8
Net earnings per car-hour	3.55	4.35	40.7
	December, 1921	December, 1920	Per Cent Decrease
Gross earnings per car-mile	0.329	0.586	43.8
Gross earnings per car-hour	6.45	11.62	44.5
Expenses per car-mile	0.292	0.428	92.0
Expenses per car-hour	5.73	8.50	32.6
Net earnings per car-mile	0.037	0.158	76.5
Net earnings per car-hour	0.72	3.12	76.8
	July, 1922	July, 1921	Per Cent Decrease
Gross earnings per car-mile	0.392	0.498	21.3
Gross earnings per car-hour	7.72	9.90	22.0
Expenses per car-mile	0.237	0.340	30.2
Expenses per car-hour	4.67	6.76	30.9
Net earnings per car-mile	0.155	0.158	1.9
Net earnings per car-hour	3.05	3.14	2.8

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[*] Abstract of paper read at the annual convention of the American Electric Railway Transportation & Traffic Association, Chicago, Ill., Oct. 2 to 5, 1922.

[†] For further particulars of these cars see *Electric Railway Journal* for June 3, 1922.

We had to do a small amount of advertising in our stations, and also distributed a card to each passenger who boarded the car at a terminal point where we sold tickets, calling their attention to the saving, not only in cash, but in time by purchasing tickets. We now have but few passengers boarding the cars at terminal points who do not have tickets. Delays at our terminals, due to loading, are much reduced with the new low-hung car with only one step. The car can be loaded to seating capacity in from ninety to 120 seconds, or about half the time taken by the old type car, even without passengers paying their fare. Formerly our register showed about 70 to 80 per cent of our passengers paid cash. Now only about 45 to 50 per cent pay cash.

Although the "Lexington" car has a free running speed of only 36 m.p.h., as against the 45 m.p.h. for the old equipment, it has been possible to maintain schedules much easier and better with the new cars, due to the quicker acceleration and the shorter space required for braking.

In the latter part of March the bus competition on our interurban lines was practically eliminated, due chiefly to the comfort and convenience of the cars.

A comparison of the gross revenue and net operating revenue of 1921-1922 with the corresponding months of 1920-1921 is shown in Table II.

The net operating revenue for July, 1922, was increased 485.4 per cent over that of December, 1921, the month of greatest bus competition, even with a reduction in fare of about 15 per cent.

After the buses were practically put out of commission, our net operating revenue on the hourly schedule each month from March to July showed an improvement over the corresponding month of last year.

ENERGY CONSUMPTION AND EARNINGS

As was to have been expected, there has been a material reduction in the kilowatt-hours used per car-mile. Including transmission and conversion losses, the old cars consumed at the switchboard from 4.3 to 6.08 kw.-hr. per car-mile. The new cars have consumed from 2.66 to 2.99 kw.-hr. per car-mile, or on a monthly comparison with the previous year, from 33 per cent to 47.8 per cent less energy. The monthly car-miles, however, have been increased from 36.9 per cent to 45.9 per cent, so that actually the net reduction in kilowatt-hours has ranged from 10 per cent to 25 per cent. In July the kilowatt-hour consumption increased 2.7 per cent on account of increased service to our amusement park.

Table III compares passenger statistics for the three different months operation of our interurban property.

In August the bus competition just started; in December it was at its maximum height as shown by the very low net earnings per car-mile and per car-hour. In July there was no bus competition, and the net earnings per car-mile and per car-hour were about on a parity with the preceding year.

The Budget—Its Preparation and Administration*

An Analysis of the Work of the Budget Bureau with a View to Securing Completeness and Timeliness—The Author Shows How the Details Eventuate in the Cash Budget, Which Is the Form for the Executive

By Harry A. Snow
Controller Detroit Edison Company,
Detroit, Mich.

A CAREFULLY thought out plan or budget of activities furnishes a better standard of comparison for the study of realized results than past experience only.

For public utilities, with heavy construction programs, there are four subdivisions of budget work as follows: (1) Construction budget, (2) operating earnings and expenses, (3) materials and supplies on hand, (4) cash budget.

In comparing the term budget with the continuous budget, the former might be called the natural form, especially for construction, but it entails peaks of effort in its preparation and has only limited prevision as it nears expiration. It is difficult to revise.

The stages of a budget item are as follows: (1) An idea, (2) a budget item, (3) a work order, (4) commitments, (5) cash expenditures.

Budget administration is an executive function. The routine of preparation and revision is best performed in a budget bureau attached to the executive staff or by a committee of executives. In the preparation of a budget estimates should be prepared by those men responsible for the carrying out of the operation estimated upon. This is fundamental if the men are to be held closely to their estimate.

The estimates made as above are sent to the budget bureau for checking, sorting and assembling. The final budget is submitted to the executive for approval.

ESTIMATES SHOULD BE CHECKED AND BUDGETS REVISED FREQUENTLY

Regular checking of estimates against corresponding actual figures is essential to the success of a budget plan. No estimate can be required if actual figures to check it are not to be available. A budget system is dependent on accurate statistical and accounting departments and cannot exist without them.

H. A. SNOW

A budget is a program worked out to its logical conclusions and based upon certain assumptions and estimates. As information supplements estimates, and as ideas change, the budget must be revised. A budget is not an unalterable law.

There is no objection to continual revision of the budget by executives, but it should not be set aside at the will of subordinates. The budget system should be so designed as to permit of extensive and frequent revision.

It is, at times, wise to preserve the first, early estimates, to study the accuracy of early estimates and the reasons for later revision.

Budget systems for small companies are not different in principle from the elaborate system suggested here. Of course, a large part of the intricate mechanism is unnecessary in this case.

The construction budget is a forecast of estimated expenditures for construction and a method of control over these expenditures. New construction is justified to increase revenue, reduce expenses or better service. Plans for new construction originate in the engineering and sales departments, and approximate estimates of cost are added to the plan.

A new plan plus previous commitment plus cost of finishing work in progress constitute an approximate budget. Study of elaboration and refinement of the approximate budget is next in order. For this purpose separate items are typed on individual sheets and the items are carefully defined. Executive approval of the budget is then secured.

Replacements are handled through the construction budget, which contains provision for imperative, desirable and contingent items. Budget items are best grouped roughly according to the property classification.

Expenditures should be scheduled by months to assist the treasurer. Against approved budget items and under the supervision of the budget bureau, work orders may be issued which, alone, are final authority to proceed with the work. Standard work order records of expenditures must be kept in the accounting department.

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*Abstract of paper read at convention of American Electric Railway Accountants' Association, Chicago, Ill., Oct. 2 to 5, 1922.

A budget item is ordinarily subdivided into several work orders. Overhead expense may be handled on separate work orders, to be pro-rated later. The plan must provide for supplemental, preliminary, standing and withdrawal work orders.

Neither commitments nor expenditures against the work order may exceed the work order estimate. This control work belongs to the budget bureau. The construction budget serves as an engineering plan of proposed construction, a scheduled estimate of the cost of the proposed work and a means of control over expenditures.

THE OPERATING BUDGET

A budget of the operating earnings and expenses and an estimate of profits form the operating budget. This will give information as to money available from operations to meet obligations and as to the probable profitableness of operation. Further, it will insure advance consideration by department heads of operating costs. Estimates are made up by the department heads and summarized by the budget bureau.

The steps necessary in preparing an operating budget are the following: (1) A classification, (2) forms, (3) assignment of responsibility, (4) preparation of estimates by department heads, (5) selection and assembly by budget bureau, (6) approval by executives.

Estimators should be furnished with records of past performance to assist them. Each employee who is responsible for the spending of a single unit of time or material should be given an opportunity to plan his work in advance.

Estimates of earnings should be based on estimates of sale of current or of passengers carried and revenue from different sources should be estimated separately.

Actual records of operation should be continually compared with the estimates and all persons responsible for the preparation and revision of estimates should be furnished the comparisons. Study of variations warns the management of unexpected situations and gives the management an opportunity to examine and correct the causes. Another result of the study of variations may suggest revisions.

A budget cannot and should not be a fixed and unalterable law. It must be continually revised to reflect new lines. Control should be exercised with judgment and with moderation. It is sometimes not desirable to exercise rigid financial control on research and service departments.

THE MATERIALS AND SUPPLIES BUDGET

It is advantageous to maintain a stock of materials on hand, but difficult to keep this stock in a healthy condition and to obtain proper knowledge of variations in this investment. Stock control is the problem of the storekeeper, but with operation and construction planned in advance, the storekeeper derives valuable assistance from a knowledge of these plans.

Effective stock control may be assisted by a stock catalog, by records of turnover and by the segregation of general stock, spare parts and construction items. Additions to investment in spare parts should be budgeted and handled on the work order plan.

Adequate warning of increases or decreases in the investment in materials and supplies must be given by the storekeeper to the budget department to assist it in the preparation of the cash budget.

THE CASH BUDGET

A financial summary of the operations of the company as set forth in the construction, operating and materials and supplies budgets serves to inform the financial officer of expected necessary financing, for time and amount.

Before the figures from the other three supporting budgets can be used, it is necessary to place them on a cash basis. This cash budget is prepared by the budget department under the supervision of the financial officer. A continuous budget is preferable to a term budget for this work.

Control curves are desirable for use in daily checking of the cash budget. The items of interest in this connection are (1) Daily bank balance, (2) receipts from operation, (3) disbursements for labor, (4) disbursements for materials, (5) other disbursements, (6) interest, dividends and tax payments, (7) financing.

Present-Day Responsibilities of Public Utility Accountants[*]

An Analysis of the Accountant's Opportunity to Assist in the Development of Utility Service, Showing Why Accounting Is One of the Essential Elements of This Service — Benjamin Franklin Furnishes the Theme

By Walter H. Timm

Secretary
Public Service Commission
of New Hampshire

When I cast about for a plain text which would express the theme around which I chose to frame a few thoughts with respect to the present-day responsibilities of public utility accountants, I found it in a proverb of Benjamin Franklin, namely, "It is hard for an empty bag to stand upright."

The establishment and maintenance of public utilities upon a stable and conservative financial basis is a condition precedent to the rendering of adequate service at reasonable rates. The growth and development of every community is directly dependent upon the success attained and prosperity of its public utilities. Instability and a narrowed or speculative financial policy inevitably reflect their penalties alike upon both the public and the utilities. Whatever is inimical to the welfare of the one is inimical to the welfare of the other. Both are placed in the throes of ineffectiveness when treasuries, unsupported by adequate revenues, ample credit and proper financial structures, grow empty.

W. H. TIMM

Out of the necessity for determining financial standing, of knowing accurately the results of doing business, there arises the need for accounting. Accounting is the one important gage by which the success or failure of business venture is ascertained. I shall discuss in rather a general way (1) the growth and development of public utility accounting, (2) the fundamental theory of standardized street railway accounting, (3) certain essential features of public utility accounting practice, and (4) standardized accounting is not a finality.

GROWTH AND DEVELOPMENT OF PUBLIC UTILITY ACCOUNTING

The term "public utility" is a distinctive designation commonly applied to those business enterprises which are considered to partake of the nature of a public calling. The case of Munn vs. Illinois, 94 U.S. 113, is the leading decision of the United States Supreme Court to apply the rule of the common law to public utility undertakings. The rule is stated therein as follows:

> We find that when private property is "affected with a public interest, it ceases to be juris privati only." This was said by Lord Chief Justice Hale more than two hundred years ago in his treatise, De Portubis Maris, 1 Harg. Law Tracts, 78, and has been accepted without objection as an essential element in the law of property ever since. Property does become clothed with a public interest when used in a manner to make it of public consequence and

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[*] Abstract of paper read at the convention of the American Electric Railway Accountants' Association, Chicago, Ill., Oct. 2 to 5, 1922.

affect the community at large. When, therefore, one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled by the public for the common good, to the extent of the interest he has thus created.

The dependence of society upon transportation has resulted in the placing of the facilities for social intercourse in the class of public callings. The degree to which each utility has projected itself into the comforts, necessities and welfare of the respective communities in which they are located has determined in a large measure the extent of the supervision that has been assumed over it. As effective competition in each industry ceased, the economic ground for regulation arose. Most of them are monopolistic, and regulation rests upon the cognizance taken by the public of this monopolistic characteristic of their activities.

When it had been demonstrated that competition could not be insured in these lines of business, because they were inherently monopolistic, the first control over them by governmental action was sought to be exercised by legislatures, both local and state, through the control of franchises and by the enactment of general laws controlling rates. This situation prevailed, generally speaking, until 1880. It was without great success. At this time a movement for public ownership made considerable headway. This movement also proved unsatisfactory.

Thereupon the regulation of public utilities by commissions grew up in extensive proportions. This movement now practically has replaced both competition and the rather hit or miss policy of supervision by legislatures. In theory, it creates a body of technically trained, impartial experts of permanence, knowledge and power equal to those of the public utilities, and clothes it with the authority of the legislature itself by delegation of that authority. By virtually guaranteeing the utility a monopoly, it hopes thereby to secure adequate service at reasonable rates.

INSURING GOOD SERVICE AT REASONABLE RATES

The dominating design of the jurisdiction of these commissions may be said to extend to the power of insuring "to the public from public service corporations reasonably safe and adequate service and just and reasonable rates."[1] No better description of the plan and purpose of this regulation can be presented than the following concise observation of the Public Utilities Commission of the District of Columbia with respect to its own powers:

> The spirit and letter of the public utilities law charge the commission with ascertaining and keeping itself informed as to the manner and method in which the business of every public utility is conducted. It is charged with supervision and regulation of the utility's organization, franchises, property, finances, accounting, rates, operation, and its compliance with every law applicable to it, including the provisions of its own charter. It is armed with ample inquisitorial powers to obtain information in any detail.

Thus it is within the dominion of the commissions to exercise supervision over the accounting practices of utilities. Because of its relation and vital effect upon the other delegated powers, the power over accounting is one of the most important. The commissions were not slow to recognize the fact that fair rates could not be determined without accurate records of the investment and the earnings and operating expenses of a given utility, nor that they could intelligently pass upon the necessity for new enterprises, consolidations and the issuance of securities without similar information. It was, therefore, not long before each had assumed the prerogative of regulating accounts. And public utility owners and managers, quick to realize the possibilities of enormous benefits to be reaped from the greater use of standard statistics and accounts with which to gage the results of their business operations, co-operated wholeheartedly in an effort to promote the work. It now dominates the entire public utility field.

It is not surprising, therefore, that public utility accounting is now recognized as a separate and distinct branch of the science of accounting.

FUNDAMENTAL THEORY OF UNIFORM CLASSIFICATION

The need for a true knowledge of "costs" and "efficiency" by all the large industrial enterprises has been such that accounting has become the most important instrumentality through which they are operated. Control over revenues and expenses is afforded by the scientific construction and analysis of accounts. The demand for intelligible and reliable information of the true relation between all factors of a business and complete knowledge of its status has been met, not by any radical change in the fundamental theories and principles of accounting, but rather by a studied and planned arrangement, and a coherent grouping of the accounts. The grouping, arranging and classifying of accounts into a comprehensive plan designed to reveal the economic effect of every factor essential to a true statement of the progress or condition of an enterprise constitutes the promulgation of "classifications of accounts."

Coincidentally with the development of classifications of accounts, there arose a demand for standardization; that is, the use of similar classifications of accounts by industries similarly engaged. It was desirable that the scheme of classification adopted by one enterprise be the same as those adopted by other enterprises in the same line of industry.

The standardization of railroad and street railway accounting was perhaps the pioneer achievement in the work of unification, and the success attained and its effect upon the general practice of the science of accounting and the use of statistics in determining efficiency of operation has been epoch-making. The classification of accounts for street railways prescribed by the Interstate Commerce Commission dominates practically the whole of the industry, for only a small number of states have prescribed their own classifications. Yet the work of standardization is far from complete.

While the adopted classification is comprehensive in scope and sufficiently elastic to cover all conditions and sizes of companies, it fails to include adequate rules and definitions for the apportionment of investment, revenues and expenses between street railway activities proper and non-operating undertakings conducted jointly, and between different phases of street railway operation such as urban, interurban, surface, subway and elevated operations. Neither have there yet been computed any standard rules for computing traffic statistics. Too little attention has thus far been given to the use by street railways of cost accounting. It is important to commissions as well as to companies that information be available to show which lines and classes of traffic are profitable or unprofitable. The operation by street railways of motor buses and trackless trolleys has accentuated this need for a greater knowledge of comparative operating costs and has raised increased responsibilties for the accountant.

CONSISTENT TERMINOLOGY IS A DESIDERATUM

Much is still to be desired also in the direction of uniformity in accounting terminology. There is still no definite and general conception of what is meant by many important accounting terms. The position of the public utility accountant justifies him in taking the initiative upon this subject. Further, the street railway accountant should at an early date institute a definite and scientific basis of segregation between all right-of-way costs and direct transportation costs, so called, the need for which is speedily approaching, due to the more general recognition that the former costs should justly be met by general taxation. Then, too, there is the responsibility for bringing about through intensive co-operation a more uniform interpretation of the accounting principles already enunciated in the classification.

CERTAIN ESSENTIAL FEATURES OF PUBLIC UTILITY ACCOUNTING PRACTICE

While the foregoing are some of the tasks that lie before the public utility accountant in the direction of placing the theory of accounting on the road to complete standardization, there also are open to him still many channels for constructive endeavor in the field of practical accountancy.

There is no more difficult problem in accounting than the practical compliance with the basic principles of the classification of accounts which are designed to insure the integrity of "capital" and the correctness of the charges to "cost of operation."

Were all expenditures of utilities for labor, materials and other items of outlay incurred during a given fiscal period promptly consumed and fully utilized, so that no part thereof remained at the end of that period, their costs in all cases would constitute an operating expense chargeable to the period during which they would be incurred. But a large part of the expenditures consists of outlays for items that last longer than the adopted fiscal period of one year. Naturally, these items, being unconsumed and not fully utilized, are not properly chargeable to the cost of the service of a single year. The whole problem of correct accounting, therefore, is that of determining which expenditures during a fiscal year represent items of outlay entirely exhausted in value and use during that year, viz., which are operating expenses or revenue expenditures, so called, and which, being not fully exhausted in value and use, are chargeable to fixed capital as capital expenditures, so called.

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[1] Petition of Berlin Electric Light Company, 3 N. H. P. S. C., 177.

The accomplishment of this desired purpose requires not only ample accounting forms constructed to insure the proper distinction between capital and revenue expenditures and a personnel thoroughly instructed in the keeping of these records from the point of origination to the books of ultimate entry, but constant vigilance and audit in their keeping.

ACCOUNTING FOR DEPRECIATION A REAL PROBLEM

If the lives of capital assets were everlasting, they would properly continue in fixed capital indefinitely. But practically all assets have a limited period of life. The wasting character of physical property raises a further problem in accounting. The destruction and consumption of items of property having an expectation of life of more than one year is just as much a part of the cost of operation as the cost of items immediately consumed. The only difference is in the period of time that elapses during the consumption; in the case of operating expense items, the consumption becomes complete during one fiscal period, while in the case of capital expenditures it is spread over a series of periods. If the period of life of all properties used in operation coincided with the adopted fiscal period for determining the financial condition of the business, their total costs would be treated solely as operating expenses. There would then be no need of a distinction between operating expenses and capital expenditures. But financial statements are needed at regular periods in the life of a utility, and many statements may be required between the dates that many assets are acquired and the dates when they are discarded. If these financial statements are to be correct, then that portion of the service value of all capital used in rendering service which disappears during each period must be included in the operating expenses of that period. In other words, as a result of the wasting character of practically all plant investment (land being one of a few exceptions), capital expenditures may well be looked upon as deferred charges to operation, some portion of which must be charged off yearly.

This depreciation is one of the most important and troublesome subjects of public utility accounting. Its far-reaching effects upon the finances of the public utility cannot be overemphasized. Without proper allowances to cover its impairment of capital, the costs of operation cannot accurately be ascertained. However troublesome it may be, it must be reckoned with. Its correct treatment in practice presents a threefold problem: (1) To fix depreciation allowances which will be sufficient at all times to enable the utility to make replacements of property as required; (2) to apportion these allowances equitably over a period of years, and (3) to record the allowances made for depreciation, and the uses made thereof, upon the books of account upon an intelligible basis.

Notwithstanding the refinement of plant investment accounts and the definitions and instructions with respect to the manner of keeping them, prescribed in the classifications of accounts of the public service commissions, experience has demonstrated that much is still to be desired both by the commissions and by the utilities in their practical application. The difficulty in this connection lies in the impossibility of relating the charges and credits to fixed capital accounts to definite items of physical property with a view to determining their correctness. The fixed capital accounts constitute in effect an inventory of property by classification under particular and similar units. Accordingly, under this method of inventory, if it is not substantiated by proper records, endless analysis of accounts is required to segregate the charges to a particular piece of construction work for the purpose of determining the amount or reasonableness of its cost.

Likewise, experience has shown that it is an impossible task to determine the original cost of any particular item of property retired. The trouble arises from the impossibility of locating and individualizing the original costs and associating them with the specific physical units abandoned. The result is that retirements in this event are apt to be credited out at estimated figures, or not be credited out at all, and the plant account will consequently to that extent be distorted. This situation was very soon recognized. Indeed, when regulation was becoming the established policy of the states, some of the more progressive public utilities had already come to realize the need of separating their records, both of construction and of certain maintenance work, also under different programs of work done.

The two methods of segregating charges to plant investment thus adopted are sometimes referred to as the "inventory" classification and "project" classification, respectively, of fixed capital. The former consists of the distribution and detail of charges to plant investment by a classification of units of property based upon their similarity of use, life, etc., while the latter may be defined as the method of segregating under special and separate accounts all charges and credits relating to particular projects.

The "project" classification of fixed capital is usually referred to as the "work order" system. Sometimes, also, it is referred to as the "job order" system. However, the latter title is more commonly applied to the system of recording the transactions under contracts for merchandise and jobbing work entered into with customers. For practical purposes it is advisable to adopt definite distinguishing titles. The term "work order" should refer to the "project" classification of expenditures relating to fixed capital, while the term "job order" should refer to work chargeable to consumers.

OTHER ADVANTAGES OF THE WORK ORDER SYSTEM

The work order system has many advantages in addition to those that accrue from corrective accounting. The procedure under it usually requires that the cost of work on given projects be accurately estimated in advance and that the work be passed upon by properly authorized officials before it is commenced. This procedure places the control of all expenditures for construction and reconstruction directly in the hands of the managing officials. In this way, the finances of the utility may be prearranged to care for the planned expenditures; the estimates may be scanned and checked up and economies be effected thereby; the advisability of proceeding with proposed work may be determined from a comparison of the estimated costs with the estimated revenues to be derived therefrom, and after the work is completed the actual costs may be compared with the estimated costs with a view to detecting waste in materials used or in failure to account for scrap retired. The detailed costs then available may, also, be used for purposes of calculations of probable costs of work under consideration in the future. And further, these same costs may be made the basis for computations accompanying requests for credit through loans and for petitions to commissions for permission to increase capital liabilities. All these benefits, and still others, are derived from proper work order records.

WHAT IS A BUDGET?

Just as the work order system should be used as a guide for the efficient and economic supervision of individual projects, so it is essential that ways and means be devised by a proper accounting procedure of charting and planning into definite programs all future operations. This procedure is afforded by the "budget." The "budget" is a prearranged schedule and plan for the future conduct of the business. While in its ordinary use it refers primarily to a worked-out plan for the management of the finances of a company, it is really, with all its supplemental data, a summarized exhibit of the application of foresight in the formulation of all the future policies of the business. In other words, it is the function of the budget to attempt to predetermine the future.

Both the "work order system" and the "budget system" are designed principally to produce economy in expenditures. In this respect they really go hand in hand. The one is the means for a preconceived financial program for the future growth of the operations of the utility prepared under the direct supervision of the officers, while the other is, in part, the medium for the efficient control of expenditures incurred in carrying out this preconceived plan. Thus the budget, in the first instance, is the guide for future work-order operations, and thereupon the actual costs and other data assembled under the work orders in turn become useful in the preparation of future budgets.

VOUCHER SYSTEM INDISPENSABLE

The accounting profession is quite generally in agreement that today a voucher system of some form is indispensable to an efficient public utility accounting practice. The primary function of the voucher system is to secure, for purposes of accounting record, positive evidence of the payment of particular liabilities. This end is accomplished by the use of a form of voucher or voucher check so used as to secure a receipted bill. But as a system, the voucher system consists, also, of a well ordered procedure for the verification and approval of invoices and for preparing, filing, paying and indexing the vouchers issued upon them. In the main, the essential features of this procedure are the same wherever the voucher system is used. Yet it must be elaborated upon more or less to meet the needs of individual companies. This, again, is a responsibility of the accountant.

Through the medium of the voucher system and of other records, the cash funds of a public utility are accounted for and safeguarded most carefully. The need for such care is self-evident. Yet money is valuable only as a medium of exchange, and since a large proportion of the funds of a utility is used in the acquisition of materials and supplies, it follows that proper and adequate records to record the purchase and use of materials and supplies are likewise essential, although this fact is not always so fully recognized or appreciated.

Materials and supplies constitute one of the primary elements of cost in the rendering of public utility service. For the most part they must be purchased in advance of their immediate use; that is, the needs of the public utility business require the keeping on hand of a considerable stock of supplies. The primary purpose of material records is to account accurately for, and to preserve the value of, the stock of materials thus carried on hand. Being received for the payment of money, and in fact being the equivalent of money, they should be safeguarded as such.

Accounting for stores, therefore, is a work of large consequence. The task of the accountant extends to the adaptation of the system to the scope of the operations of the company, and as well to regular checks of its current effectiveness, for materials accounting is very largely dependent upon the human element. If the procedure is correct and it is operated efficiently, it should serve (1) to avoid thefts of supplies, (2) to eliminate wasteful use thereof, (3) to effect a systematic method of ordering goods, (4) to produce an accurate distribution of materials and supplies to appropriate construction or expense accounts, (5) to set up a definite method for the disposition of scrap, and (6) to simplify the work of periodically inventorying materials and supplies on hand.

Confronted with this array of benefits accruing from a proper procedure in the handling of materials and supplies, utilities and accountants are given ample excuse for exercising a diligent endeavor for greater efficiency in the operation of their stores departments.

STANDARDIZED ACCOUNTING NOT A FINALITY

Thus public utility accounting reveals itself as a highly specialized and effectively standardized procedure. Because it was indispensable to governmental department having control over rates, service, finance and taxation, its use in the regulated enterprises is far in advance of that in the so-called private industries.

In the uniform classifications of accounts that have been developed there have been applied certain underlying principles to all classes and sizes of utilities. These principles recognize that in the main the accounting problems of one state or one utility are really the accounting problems of all. The design has been to create a procedure correct in principle and logical in scheme throughout the entire public utility field. Its development has been a gradual evolution, occasioned by a search, as it were, for "a common language of accounts."

Yet it would, indeed, be far from the truth to say that public utility accounting is, or ever will be, a copy-book method of accounting. Standardized accounting is not a finality. Neither is a knowledge of standardized accounting a finality. Speaking metaphorically, it is not merely an anchor to which to tie, but a chart and compass by which to navigate. But it is merely a plan, and no plan will work itself. It must be given the direction of human judgment and discretion. Accounting differs in no way from other businesses or professions. Outside of certain guiding principles, no definite rules can be laid down for engineering, or medicine, or manufacturing, and none can be made for accounting. The standards fixed and adopted in public utility accounting are merely the guiding principles. Although they are an exhibit of a rare attainment in accounting, they remain but abstract "standards," without the application of those human qualities which in all worldly affairs make for what is commonly termed "success."

Among the first of these necessary attributes which the accountant should bring to the solution of the problems of the future is "initiative." Initiative consists to a large degree in the application of common sense. The application of common sense to accounting distinguishes accounting from bookkeeping. It involves the original planning and the subsequent interpretation of the work of bookkeeping. Hence without originality, initiative and individuality the accountant becomes merely a bookkeeper. He also needs physical as well as mental good health. And again, he must have confidence in himself and in the future of public utility accounting as a field for constructive endeavor; he must have personality and character.

The responsibility of the accountant is a large one. He is the only official who has equal contact with every other department and activity of the utility. His duties require that he be interested in and know the facts of every part of the history and work of its organization. Good accountancy requires it. Every department and every man must be drawn upon for the facts, if the accounting records are to be exact. This is a work of no small magnitude. The accountant must train himself to shoulder these responsibilities.

Accounting records are the instrument by which the manner of the discharge of the tremendous trust reposed in managing officials by investors is exhibited. The accountant is thereby placed in direct control of the destinies of business. He is one of its executive officials, its principal business adviser. If he is to meet his full responsibilities, his education cannot be wholly in the field of accounting. The scope of his vision must extend to the field of law, banking, finance, labor, psychology, and, in fact, to a clear perspective of all the activities of our social and economic life.

With your permission, I will leave off as I began, quoting an adage, the common adage, "A stream cannot rise higher than its source." Likewise, a public utility cannot achieve greater success or attain a higher degree of progress than the ambitions and attainments held out for it by its officials. Let the success and progress of the nation's public service corporations, which have been so noteworthy in the past, not be limited in the future by a lack of vision on the part of its accounting officials.

Finally, out of a considerable experience close to public and utility service, I have an unshaken faith that if the utilities and commissions continue to meet the obligations of the future as they have met the demands of the past they will have earned the lasting praise of all coming generations.

Welding as Practiced by Electric Railways

A Symposium

Papers Forming Basis of Discussion at Joint Meeting of American Welding Society and American Electric Railway Engineering Association at Chicago Convention—Fields of the Several Varieties of Welding Were Outlined

A NOVEL FEATURE of the annual convention of the American Electric Railway Engineering Association this year was the joint meeting with the American Welding Society. Papers were read by representatives of the Welding Society, the electric railways and manufacturers.

In opening the symposium C. A. McCune, president American Welding Society, explained the organization of his association and the field which it is endeavoring to cover. It was organized to provide united and co-operative action and extend the knowledge of the art of welding by every recognized process; also its field of industrial application. This is accomplished through society activities, the American Bureau of Welding and the society *Journal*.

Sections of the society are now organized in nine leading industrial centers. Regular monthly meetings are held in each, at which papers and lectures form the basis of discussion.

WHAT IS THE AMERICAN BUREAU OF WELDING?

The American Bureau of Welding was organized by the society and the Division of Engineering of the National Research Council, as an advisory committee on welding research and standardization. The bureau is the research department of the society. It is made up of one representative each from a number of co-operating organizations, E. M. T. Ryder being the representative of the American Electric Railway Association.

The *Journal* of the society is a monthly publication distributed free to members. It covers the latest developments in welding, the progress made by research committees of the bureau and their findings, news of local sections, employment opportunities, etc.

Mr. McCune was followed by W. Spraragen, secretary of the American Bureau of Welding, who explained in detail the organization and method of operation of the bureau. This, he said, is a joint advisory committee of the American Welding Society and the Division of Engineering, National Research Council.

The Council is a co-operative organization of American societies organized in 1916, under the charter of the National Academy of Sciences, to co-ordinate the research facilities of the country for work on war problems. In 1918, by executive order of the President of the United States, it was reorganized as a permanent body for the promotion of research and the dissemination of scientific knowledge for the national well-being.

The council is not a governmental bureau, although it is in close and cordial relations with the government. It is supported in part by a $5,000,000 gift made by the Carnegie Corporation in December, 1919. A building is under erection in Washington for the joint use of the council and the National Academy of Sciences.

The Division of Engineering is one of thirteen divisions of the council, and it, with the assistance of an advisory committee or board for each field of engineering, plans programs for projects brought to it or proposed by it, aids in organizing the interested group, finds men and means for carrying out the plans, co-ordinates the work of societies, industries, governmental bureaus, universities and individuals, and in general stimulates research on the problems selected. Work on each problem is conducted under the supervision of a research committee, led by a chairman who is a recognized expert.

The American Bureau of Welding is organized to foster the improvement of welding methods, material and equipment and to establish codes and standards. Its director is Prof. C. A. Adams of Harvard University.

The procedure developed by the bureau for its work consists somewhat as follows: (a) Preparation of bibliography and critical summary of present knowledge. (b) Consideration of summary and laying out of specific tests. (c) Assignment of definite portions of the program to appropriate laboratories, sub-committees, companies or individuals. (d) Stimulation of research in this field as may be fitting, by individuals, government bureaus, corporations or universities.

WELDED RAIL JOINTS

The subject of rail joint welding was covered by E. M. T. Ryder, engineer of way Third Avenue Railway System, New York, N. Y. He said that way engineers find this subject fascinating, besides promising substantially to solve one of the most serious track problems. At the same time it carries a lurking danger in the allurement it offers for experimentation on a large scale, with unknown ultimate expense.

Taking up the history of the subject, Mr. Ryder called attention to the fact that the Falk cast-weld joint was in use before horse cars disappeared, and Lorain bar welds were being tried out nearly thirty years ago. Cast-weld joints were installed in Brooklyn in 1890 on old rail and in 1894 in St. Louis on new rail. Five hundred thousand of these joints were installed in five years.

To the Lorain Steel Company and its predecessor, the Johnson Company, is due the credit for making a success of the bar-weld joint, the pioneer work of which was done in 1894. The original bar weld has been improved by the addition of a chock block welded under the head of the rail directly at the joint and also welded to the web of the rail and to the main welding bar. Some 800,000 bar welds have been installed.

The Lorain Steel Company is now also installing a butt weld under the Jacobs patents, upward of 1,000 having been put in during the past year.

PROGRESS OF THE ELECTRIC SEAM WELD

As to the electric seam weld, this type was first developed on a commercial scale in Germany and introduced into this country in 1914 by the Atlantic Welding Company. Four years before that date, however, joints designed by C. F. Gailor had been installed in track in Hartford, Conn., using acetylene gas in making the weld.

The Atlantic Welding Company in its first work in New York City used double refined iron plates, Swedish iron rods and a semi-automatic control for the electrode holders, the current being obtained from imported motor-generator sets weighing 5 tons. Changes were gradually made to the present methods, using steel plates and rods and hand control for the electrodes with generating apparatus light enough to be moved about by two or three men.

As to method of reducing voltage for the arc, the resistance method is also in use and both metallic and carbon electrodes have their advocates.

In describing present conditions, Mr. Ryder used the term "experimental or developmental" and said that an impartial observer could hardly say that we have reached normalcy.

Thermit welding, said Mr. Ryder, was

introduced into the United States in 1904 and has had three principal stages of development. The first was that in which the face and web of the weld only were welded. In the second stage the rails were separated, the thermit casting filling the entire space, and forming part of the running surface of the rail. The third, or present method, introduced ten years ago, involves inserting a head shim of rail steel to form the running surface, the thermit steel welding the rest of the section including, in girder rails, the lip and the outside of the head. Recent improvements have cut down the amount of thermit metal and of manual labor required, while at the same time increasing the reliability of the process.

Mr. Ryder next took up the present conditions in the art of welding rail joints and, by quoting from progress report No. 1 of the committee on welded rail joints, he showed that the whole art is yet in its embryonic stage. This led to a statement of the importance of co-operation to secure satisfactory future development. Scientific study of such complicated problems as exist in the production of welded rail joints, said he, can be undertaken to advantage only under expert direction and with adequate resources. Both of these requirements seem in a fair way to be met by the organization of the committee on welded rail joints. This committee should have the backing of the entire electric railway industry.

WELDING IN ELECTRIC RAILWAY SHOPS

In discussing welding for car maintenance, J. S. McWhirter, superintendent of equipment and buildings Third Avenue Railway System, referred to the extent of the system with which he is connected and the advantages of having all but minor welding repairs done at a central repair shop. At present, the Third Avenue Railway is doing 40 per cent of its welding with the graphite electrode, 55 per cent with the metallic electrode and 5 per cent with the oxyacetylene torch. The equipment used consists of five constant-energy, 200-amp. individual motor-generator sets and two constant-potential motor-generator sets, one of 300-amp. rating and one of 400-amp. rating. The company still uses two banks of resistances fed by the railway circuit, but it is planning to replace these resistances as fast as the development of the art and operating economy justify the change.

The oxyacetylene torch is used principally for repairing bronze armature bearings, brushholders and like parts. This is preferred to electric welding for such metals because of the objectionable fumes which result when bronze is welded with the arc. When electric welding was first undertaken, the graphite electrode was used, but the company has gradually changed over toward the metallic electrode, as welds made by this latter method have proved more satisfactory when subjected to stress.

The present welding organization consists of one foreman, who devotes about 60 per cent of his time to other work, one semi-automatic-welding-machine operator, four metallic-electrode welders, two carbon-arc welders and one oxyacetylene welder. This force has been found sufficient to do all the welding necessary for maintaining 1,600 cars and, in addition, for a considerable amount of reconstruction work. The volume of work turned out runs to about 25,000 lb. of bare soft steel welding and 1,500 lb. of manganese bronze per year. The average amounts of metal used per operator with the three types of welding are 1.2 lb. per man per hour with the metallic electrode, 1.6 lb. with the graphite electrode, and 0.6 lb. with the oxyacetylene torch.

WHAT THE THIRD AVENUE DOES IN THE SHOP ALONG WELDING LINES

Referring to the various classes of work done, Mr. McWhirter said that the biggest routine welding job is the rebuilding of worn axle-bearing seats on cast-steel motor shells of 65-hp. motors. Two of these shells are welded per day, one operator hand welding with $\frac{3}{16}$-in. metallic electrodes and one operator working with $\frac{1}{8}$-in. metallic electrodes fed by the semi-automatic welding machine. The concave surfaces of the axle bearing seats do not permit the use of full automatic machines. The welding and reinforcing of cast-steel and forged truck frames is now done with $\frac{3}{8}$-in. metallic electrodes, and very satisfactory results are secured.

Gear-case welding also has proved very economical. Mr. McWhirter estimated the annual saving on gear cases alone as about $12,000 for his company. Most of the gear cases welded are of malleable iron.

In regard to the welding of axles, Mr. McWhirter said that when the automatic welding machine was first developed, one of these was installed on a second-hand lathe and used for welding axles. The deposited metal was laid on in the form of a screw thread as the axle revolved in the lathe. A careful record was kept of all welded axles, and it was found that these broke through the welds at from six to nine months of service. Investigation of the cause of these breakages showed them to be due to the quenching action of the mass of the axle upon the surface of the axle subject to the heat of the arc, the result being a hard and brittle layer of metal surrounding the axle immediately under the soft deposited metal. It was found that this hard layer could be removed successfully by annealing the welded axle under close temperature control, but after the axle was annealed, it was necessary to remove the warpage caused by the annealing and to true the bearing surface in a lathe. When the cost of the labor, material, electric current and equipment required to reclaim the axle was totaled, it was found that the saving was only about 20 per cent of the final cost of the new axle.

Other parts reclaimed by welding are brakeshoe heads, brake beams, side and center bearings, journal boxes, step hangers and other truck and car-body parts. Mr. McWhirter estimated the annual net saving of these parts to be about $45,000. This saving is after deduction of other shop labor on the reclaimed material and with a liberal allowance for maintenance, depreciation and fixed charges on the welding equipment, wages of foremen and clerks, superintendent, building rental and other items of overhead.

THERMIT IN THE SHOP AND ELSEWHERE

The use of thermit welding by electric railways was discussed by J. H. Deppeler, chief engineer Metal & Thermit Corporation. Mr. Deppeler said that one of the most striking developments in the use of thermit by electric railways was for welding rail sections to form frogs and single and double-track crossings. This method of construction has advantages over the bolted type, and the cost is much less than that of manganese. Service tests indicate that the thermit type of construction has held its own in comparison with other installations costing two or three times as much.

Another use for thermit welding in the shop is in connection with the making of compromise joints. Due to the increase in the size and depth of rail used by electric railways, most railways have a large variety of sizes and types of rails in use, and wherever these sections come together compromise joints can be made very satisfactorily with the thermit process.

Mr. Deppeler said that several railways are obtaining very satisfactory results through the use of thermit welding for motor cases and truck frames. With this class of work thermit welding produces a great saving when compared with the cost of new parts.

Oxyacetylene welding in electric railway shops was discussed by T. Gillespie, sales engineer Oxweld Acetylene Company. Mr. Gillespie said that there has been a large increase in the use of gas welding and cutting in electric railway shops. Gas welding and cutting is now considered almost indispensable for a very considerable list of operations, particularly for cast-iron welding and for reclamation work where welded joints are subjected to unusual strain and vibrations.

Referring to the three methods of welding, thermit, electric and oxyacetylene, Mr. Gillespie said that he considered each to have its particular field of usefulness and economy. Thermit welding is generally conceded to be superior for joining heavy sections and electric welding for use where electric current is generated in the regular course of a company's operation as in the electric railway field. It thus possesses certain advantages of economy over other processes. Mr. Gillespie enumerated the large number of uses which electric railways were making of the oxyacetylene process and these included all forms of repairs and reclamation work.

American Association Proceedings

In Addition to Addresses from Distinguished Business Men, the Program Contained Stimulating Discussion on Public Relations—Addresses by Past-Presidents Were Impressive — Attendance of More than 4,000 Broke Record

THE forty-first annual convention of the American Electric Railway Association was called to order by President Todd at 10:20 a.m. on Tuesday, Oct. 4. At that time there was a good attendance in the hall, and it later increased to a large audience.

The first order of business was the presentation of the president's address, which will be found in abstract on another page of this issue. Then followed the address of the executive secretary.

REPORT OF THE EXECUTIVE SECRETARY

In his report this year J. W. Welsh, executive secretary of the American Association, departed from precedents in matter and form, placing the statistical information in a series of appendixes and devoting the body of his report to an explanation of what the association is trying to do, together with a plea for co-operation. To supplement the text he used a number of charts showing the organization and giving other information.

Mr. Welsh divided the major activities of the association into the following seven sections: Committee work, publicity, information service, *Aera*, the Washington office, co-operation with other associations, and the annual convention, midyear meeting and exhibits. During the year 500 committeemen, representing fifty different committees, held approximately 100 meetings. As to publicity work, when this was started by the association, only twenty companies were doing advertising, while today more than 200 are doing it. Last year the Bureau of Information and Service answered 10,353 requests for information. All of the association staff are called upon to carry on this work, but personal mention was made of the work of E. J. Murphy, chief statistician, and the research work of Miss Julia Kelly, librarian. Mr. Welsh also mentioned the fact that J. W. Colton comes before the membership this year for the first time as editor of the association magazine.

The report called attention to the fact that in the field of engineering the association can assist member companies when regulations on the part of public utility commissions or legislation in the states may call for special action. The association's special engineer, G. C. Hecker, in addition to his work for the Engineering Association, is in a position to act for member companies in such cases and his services are available without charge.

Referring to the Washington office, Mr. Welsh said that these activities are covered by the report of the committee on national relations, but he reminded the members that the services of the office are at their disposal. Companies coming under the jurisdiction of the Interstate Commerce Commission may be relieved of the expense of having a special representative by appointing Charles L. Henry as their statutory agent.

R. I. TODD

The association is also doing a great deal to co-operate with other associations. Cordial relations, for example, are being established with those having to do with establishing standards of municipal regulations affecting construction of track and roadways, etc., the regulation of traffic on streets and highways, and many others.

President Todd, in calling for the report of the treasurer, explained that it would be read by Mr. Faber, as the treasurer, Barron G. Collier, was prevented from attendance because he was being installed as Deputy Police Commissioner in New York City. A summary of the report of the treasurer for the nine months ended July 31, 1922, follows:

On July 31, 1922, the cash net bank balance was $55,056. The total receipts for this period amounted to $173,219, of which $142,654 was for dues. The corresponding expenditures for this period were $104,951, making the net income $68,267. Adding this to the surplus existing Nov. 1, 1921, of $2,372, there was available on July 31, 1922, a surplus of $70,640. As the association year does not end until Oct. 31, it is not possible to present a financial report for the year. The cash bank balance on Sept. 30, 1922, was $77,038.01, but the major portion of the association's expenditures result from the holding of the convention and exhibit, and the principal bills have not yet been received. The final audited report for the twelve months ended Oct. 31 will be published in complete detail in the proceedings of the association.

An abstract of the report of the finance committee was then read.

FINANCE

This committee was created in accordance with the provision of the constitution adopted at the last convention. It has investigated and approved regular and routine salaries and expenditures and passed on all other expenditures before commitments were made. All vouchers were approved by the signature of one member of the committee, before being sent to the treasurer for payment.

The policy of rigid economy was adopted, the personnel was kept down to the lowest possible number and no salaries were increased without urgent cause. Up to this time, in the opinion of the committee, the production mark of the organization has not suffered but the volume has materially increased and the expenses for personal effort and additional facilities must necessarily increase in the future. The excellent financial results of this year have been made possible almost entirely by the active, intelligent and loyal co-operation of the executive secretary and his entire staff.

As the income of the association is limited more or less by the dues, which should not be increased at this time, and as expenses will necessarily increase in the future, the committee recommends that the surplus of the association be gradually built up so that it will have sufficient available assets for any emergency.

The report was signed by John H. Pardee, chairman; R. P. Stevens and J. G. Barry.

The president then announced the committee on resolutions, consisting of Thomas N. McCarter, chairman; P. N. Jones, W. R. Alberger, P. S. Arkwright and H. W. Blake.

ADDRESS BY H. A. WHEELER

President Todd then introduced as the next speaker Harry A. Wheeler, vice-president Union Trust Company, Chicago, and former president United States Chamber of Commerce. Mr. Wheeler's address appears in abstract on another page.

An unannounced number on the program was an address by Mayor B. F. Brough of Toledo, who has been instrumental in working out on a constructive basis Toledo's city transportation problem.

MAYOR BROUGH SPEAKS

Mayor Brough said, in part, that he was very much impressed with the address of Mr. Wheeler and that he was glad to see before him a body of business men gathered from all parts of the country to discuss business matters. He declared that this country is a republic and not a democracy, and urged the delegates to study the federal constitution, to determine for themselves what he meant by that remark. Continuing, he said that he was present because his problems, to a certain extent, are railway problems. In Toledo the street railway system is being operated under the plan of service at cost, and therefore the fares are determined by the amount of business which the company does. When he became Mayor on Jan. 1, 1922, he found the ridiculous situation of a practically municipally owned transportation system being run down because the city was permitting direct competition of jitney buses with that line. The city was interested because the fares depended on the receipts. He believed that a transportation system in a city the size of Toledo has necessarily got to be a monopoly. It is all right to have bus service and other forms of transportation, but they must operate simply as feeders and helpers to the one principal form of transportation which must necessarily be maintained if the people are going to have a big, growing city. Toledo has gone so far under its present plan that it is doing the paving between the tracks and taking the money out of the general fund; in other words, it is spreading the whole cost of that paving throughout the city on the principle, which he thinks is correct, that the transportation is absolutely a necessity for every one in the city regardless of whether he has a Ford or a Packard, or any other form of transportation, so that he can ride in a vehicle of his own and never patronize the street railway company.

TELEGRAMS READ

President Todd then read telegrams from Lord Ashfield, better known to American electric railway men as Albert Stanley, giving his greetings and best wishes for a successful convention, and also from Past-President P. H. Gadsden, who voiced regret that unexpected business detained him from attending the convention.

President Todd next introduced M. C. Brush, senior vice-president of the American International Corporation, Philadelphia, who took charge of the meeting during the symposium on public relations. Before introducing the speakers, Mr. Brush made a few comments of his own on this subject. His remarks and those of the other speakers appear elsewhere in this issue.

Wednesday Session

The Wednesday morning session was called to order promptly at 10 o'clock by President Todd. The first order of business was the presentation of a number of committee reports, and the following were presented:

COMPANY AND ASSOCIATE MEMBERSHIP

New company members for the year were reported by the committee on company and associate membership to number sixty-three, which is approximately 10 per cent of the number of the roll of Sept. 20, 1922. There was a loss of five railway members, a gain of ten manufacturer members, and fifteen companies were elected to the new grade of associate membership. The net gain in company members was twenty, the present total therefore being just two less than 600.

The association's advertising section was credited with substantial aid to the committee, particularly in the preparation of a display card embodying the emblem, adhesive seals for use on correspondence, and a booklet entitled "Why Belong to the American Electric Railway Association?" The campaign was carried on by dividing the country into local sections which were assigned to members of the committee. W. R. Alberger received honorable mention for bringing in a total of six railways and one manufacturer.

This report was signed by F. R. Coates, chairman; W. R. Alberger, F. G. Buffe, L. E. Gould, J. H. Hanna, P. N. Jones, M. B. Lambert, Henry H. Norris, W. S. Rodger, E. M. Walker, E. P. Waller, Rolla Wells and E. F. Wickwire.

CONSTITUTION AND BY-LAWS

For the committee on constitution and by-laws, the chairman, L. S. Storrs, referred to the letters sent to the membership on Aug. 9 and 28 regarding a proposed revision of the constitution and by-laws with respect to the number of regular meetings of the executive committee. The revision referred to consists in a change in the plan for holding regular monthly meetings to one involving a total of nine regular meetings during the association year. Three of the regular meetings are proposed to be held at the time of the meetings of the association, one immediately before the annual convention, one immediately thereafter and one at the time of the midyear meeting. The time and place of the remaining regular meetings would be fixed by the executive committee at its first meeting in the association year. Special meetings would be callable by the president or any five members of the executive committee, and seven voting members would constitute a quorum.

Mr. Storrs explained that while there has been an exceptionally large attendance at the monthly meetings during the past year and many matters of importance have come up each time for action, the general belief on the part of the executive committee was that the present plan allows too short a period between meetings and imposes an unnecessary burden of time and expense upon the members of the committee.

PUBLICATIONS

The publications committee came into existence with the adoption of the new constitution at the 1921 annual meeting. With the active co-operation of the executive secretary general direction has been assumed of editing all matters presented for publication.

Acting upon what appeared to be the general feeling, as expressed at the last annual meeting, it seemed necessary to make some changes in the editorial policy of *Aera*, and to accomplish this and relieve the executive secretary as much as possible it was decided to employ as editor a man having a broad experience in the publishing field as well as detailed knowledge of the industry. John W. Colton was selected. Improvement can be made only through the whole-hearted co-operation of everybody who has the interest of the industry at heart. Listed, the aims of *Aera* include the following:

To be an authoritative, strong, able, forceful publication.

To keep electric railway men fully informed of changing conditions.

To speak with authority on matters that affect the very foundations of the industry.

To interpret developments and weld together and harmonize the purposes of the industry throughout the entire land.

To be the official publication in which record is made of the work of the association.

To be the personal organ of every member of the association.

To publish in concise form statistics, quotations from reports, important court decisions and other matters that are vital in their effect on the industry, so as to assist executives in obtaining data needed for addresses before local clubs, chambers of commerce and the like.

To be intensely interesting not only to executives and officials but to the employees, company section members, public utility commissions and to the public, which is especially interested in the maintenance of electric railway service.

To be conducted so that every branch of the industry may learn something in it of interest, and every branch may learn what other branches are doing.

To teach the realization of the interdependence of all of the branches of the business.

To publish digested interpretive information on: new forms of franchises, new methods of control, newly developed vehicles for public transportation, new aspects of the ever-present problems of financing, competition to electric railways, legal principles governing protection of capital invested in public service corporations, important ventures in municipal ownership and operation, and other developments.

Not in any way to compete with the present excellent trade publications.

The method of treatment proposed is: To be dignified without being dull, to be snappy without being impertinent and offensive, to be earnest and sincere without being solemn, to be constructive, helpful, courageous and informative.

The report was signed by L. S. Storrs, chairman; Harlow C. Clark, E. C. Faber, M. B. Lambert, C. E. Morgan, Charles C. Peirce, A. M. Robinson and Martin Schreiber.

Following the presentation of this report Mr. Storrs appealed to company executives and members of the association in general to send advice to help the committee and editor of *Aera* to find the best and most useful place in the field for *Aera* service.

The report of the publicity committee was then presented by J. N. Shannahan, its chairman. An abstract is given below:

PUBLICITY

The publicity committee has continued to direct the work of the advertising section of the association, in co-operation with the committee of one hundred. It reports a greatly widened interest in public relations, publicity and advertising work in the industry and a marked contrast in public conditions to those when the section was organized two years ago. Out of 239 companies, representing one-half the mileage of the country, 207 are advertising in newspapers or through company channels or both, and only thirty-two are doing no advertising. These thirty-two represent only 5 per cent of the mileage of the 207. The advertising section is called upon frequently by national news associations, newspapers, magazines, special writers and others for help in the preparation of special material, and its news releases enjoy a high standing.

The service performed by the section includes the following:

Preparing booklets and advertising material dealing with current situations and forwarding this matter regularly to all electric railway companies in the United States.

Giving counsel for special campaigns when requested by individual companies.

Co-operating with the committee of manufacturers in preparing goodwill electric railway advertising literature.

Issuing a monthly bulletin called *Truth*, containing news items, editorial comments and other material to be used in house organs, speeches, interviews, etc.

Co-operating with state committees on public utility information, the N.E.L.A., A.G.A., and other national organizations.

Preparing association advertising copy for membership drives, conventions and other activities.

Suggesting and arranging special advertising features for regular occasions, such as National Electric Railway Day.

The director also attends state and local conventions and meetings and talks on public relations and advertising problems.

The report gives a list of the booklets, posters, etc., issued during the year, an elaboration of a number of the services mentioned above, and an account of the organization of a publicity men's committee, consisting of the publicity men of a number of large companies, to offer advice to the publicity committee as to methods for improving its work. In conclusion the report refers to May 4, 1923, as marking the thirty-fifth anniversary of the completion of the first commercially successful overhead trolley line in the United States and recommends that this be made the occasion of a national celebration of the greatest possible magnitude. The members of the committee on publicity were: J. N. Shannahan, chairman; Barron G. Collier, vice-chairman; P. S. Arkwright, Walter A. Draper, L. E. Gould, W. F. Ham, S. W. Huff, H. D. Shute and L. S. Storrs.

A Telegram from

CHARLES M. SCHWAB

to the Convention Thursday said:

"We have great reason to be optimistic today over the future economic condition of the country. We have been through a trying period, but my own personal feeling is that we shall emerge once again into the sunlight of good business. The period through which we have just passed has been to business as a period of training is to an athlete. Sacrifices have been made by almost all of us, but it is well to remember that it is only by sacrifice that we progress. The personal note which I wish to sound at the present time is that the opportunity of this country to continue to be the workshop of the world to an even greater extent than ever before is limited only by her capacity for hard work and sound business judgment. Qualities which have made America great will make her still greater in the future."

Mr. Shannahan said in addition, to indicate the effectiveness of the work of the director of the advertising section, that with nineteen conventions in Chicago already on the third day of the convention more than 4,000 newspaper column inches of publicity on the convention had appeared in Chicago papers.

The report of the committee of one hundred was presented by A. W. Brady in the absence of Guy E. Tripp, the chairman of the committee. An abstract will be published later.

W. H. Sawyer, chairman of the committee on co-operation with state and sectional associations, presented the report of that committee. An abstract follows:

CO-OPERATION WITH STATE AND SECTIONAL ASSOCIATIONS

The committee on co-operation with state and sectional associations is, as the name indicates, a committee on co-operation serving as a connecting co-operating link between each of the different state and sectional associations and between these associations and the American Electric Railway Association. This committee is a new committee and has no defined functions other than to co-operate to the greatest extent practicable.

Each member and each association has been requested to furnish each and every other member and association with copies of all letters, data and information sent out to its own membership, the thought being that in this way each association could be posted and informed as to the functioning of each other association. The plan if strictly followed out will be very helpful and will make this committee a most important one.

The committee has been somewhat disappointed that up to the present there has not been the co-operation between the different associations that should be. It has not been feasible to reap the full benefit from the possibilities of this committee due to the fact that a number of the state and sectional associations have not considered that what they were doing was important enough to keep others advised.

In addition to advising each other as to association details, one of the functions naturally falling to this committee should be to keep the parent association advised of such legislative and regulatory proposals as are of national interest. The parent association can then co-operate and can also assist with data and information as to what has been done elsewhere along the same lines.

The report was signed by W. H. Sawyer, chairman.

The report of the committee on company section and individual membership was then made by Martin Schreiber, its chairman.

The feature of the morning session was the report of the committee on nominations and the election of officers. The list of officers elected is given elsewhere in these columns.

The next report received was that by the committee on valuation, presented by J. P. Barnes, chairman. An abstract is presented herewith.

VALUATION

The committee on valuation reported that the most recent decisions uphold "fair value of the property . . . at the time of the inquiry" as the proper base for rate making. There is still much confusion in the use of the terms "depreciation" and "deferred maintenance"; this, however, is more a question of accounting than valuation except for its effect on valuation made on a basis of "cost less depreciation."

The principal work of the committee has been to carry on the study recommended by the 1921 committee of "yardstick" methods of valuation. Details of two particular valuations show the efficacy of this method:

1. The Connecticut Company (for specific details see *Electric Railway Journal*, vol. 57, pages 947 and 985, issues of May 21 and May 28, 1921). Two principles were the basis of this valuation:

a. The determination of hidden quantities and fixing of unit cost are matters of opinion and different results may be obtained by different values.

b. While there is a variation in minor details of property, the major part of these differences do not appreciably affect the total cost.

These two principles led to two conclusions:

a. There is little warrant for making a highly detailed appraisal of a part of the property if at much less cost these facts can be found with at least the degree of accuracy obtained in the case of another and considerable portion of the same property.

b. Specific record of each minor difference is unnecessary if average figures can be applied to groups of such differing elements.

The committee gave reasons for the accuracy of yardstick methods, and indicated the limitations within which the methods may be applied. Checks on the method are given from work done under Professor Swain where both yardstick valuations and figures of cost were compared, showing variations of from 0.7 to 5.6 per cent.

2. The Louisville Railway, of which six rapid valuations and one detailed valuation were made by various agencies, the six rapid valuations giving an average figure 3.4 per cent higher than the detailed valuation.

The committee recommended:

a. That wherever applicable the yardstick method of valuation be employed.

b. That the committee for next year endeavor to complete arrangements with the National Association of Railway and Public Utilities Commissioners, in a search for broad, fundamental principles of valuation.

c. That a study be made of "price trends" and a method worked out by which they may be used in determining the "fair value of the property useful and used by the company, at the time of the inquiry." The report was signed by: James P. Barnes, chairman; Arthur W. Brady, Robert M. Feustel, Williston Fish, J. H. Hanna, W. H. Maltbie, A. T. Perkins, Albert S. Richey, W. H. Sawyer and Paul Shoup.

Following this report the following letter from Albert T. Perkins, manager for the receivers, United Railways of St. Louis, was read:

"The first of the three recommendations in the report of the committee on valuation reads as follows: 'That wherever applicable the "yardstick" method of valuation be employed.' While signing the report of the commitee I felt that some interpretation of the qualification 'wherever applicable' should be made. My understanding of that qualification is about as follows:

"Yardstick methods are applicable: (1) when valuations are carried out jointly by corporations and commissions for taxation assessment purposes, when no third parties appear; (2) when valuations are carried out jointly by corporations and commissions for rate-making or reorganization purposes when no third parties, such as municipalities, civic associations, etc., are contestants, and when court review is not probable; (3) when valuations are made by representatives of financial institutions; where the general character and extent of plant are to be appraised for financial standing.

"Yardstick methods are not applicable: (1) when valuations for rate-making or reorganization purposes are carried on before public commissions and the extent and value of the property are contested by third parties, such as municipalities, civic associations, etc.; (2) when court review of the results will probably be necessary.

"These explanations seem to me to be quite necessary, especially when political considerations become a factor. Unfortunately there seem to be some 'engineers' who seem willing to make up so-called 'valuations' on 'yardstick' methods in almost any way to meet the desires of politician clients. That sort of thing has to be met in controversies before public service commissions and courts. In such cases you might have your own 'yardstick' valuations by the most reputable engineers you can find and then you would have to establish before the commission or before the court the fact that your own engineers are reliable and that the engineers of the other parties are unreliable and unworthy of credence, and perhaps more difficult still, you would have to establish that same thing in the public press."

W. H. Sawyer, East St. Louis, a member of the committee, said that he did not agree with Mr. Perkins. As a business proposition he thought railways should approach a greater use of the yardstick method as a matter of good business. He said he thought that that was largely the view of the members of the committee.

W. H. Maltbie, Baltimore, also a member of the committee, said that he agreed with Mr. Sawyer. There is a certain type of court which does not now accept the yardstick method as sufficient evidence, and a certain type of cross-examination seems to underlie the method, but that is only a temporary condition and even then does not actually militate against the advantageous use of the method. Mr. Maltbie said he thought it was also useful with third parties present and interested. Of course, as Mr. Maltbie pointed out, in Maryland, court cases have to start from the beginning anyway so that even when appeal is taken to court, the fact that yardstick methods have been used in lower hearings creates no embarrassment. However, Mr. Maltbie urged that this association carry on the work so that finally yardstick methods will be recognized by commissions in their practice and eventually established by statute.

E. F. Wickwire, chairman of the committee on co-operation of manufacturers, presented the report of that committee with his usual witticisms. An abstract follows:

CO-OPERATION OF MANUFACTURERS

This committee was appointed and began its work less than a year ago, but has sent out approximately seventy-five separate pieces of electric railway propaganda to all manufacturing members of the association and to various other manufacturers who come in contact with electric railways, altogether to the extent of more than 700 individual companies. Many manufacturers approved the plan, but did not know how to go about it. To show this has been part of the task of the committee. A booklet which it has issued entitled "The Truth About Electric Railways" sets out in concise manner the high points of the electric railway situation. This booklet was distributed through the manufacturers to virtually every salesman of the electric railway supplies in the country and many factory workers received copies. A bulletin called "Truth" containing various news items and editorial comments about electric railways has also been issued.

Progress is evident. Some manufacturers have been presenting excellent articles to the general public through the medium of advertising space in the general magazines. Others have been sending out inserts with dividend checks, reminding the stockholder that he is serving his own interests when he helps the electric railways to get fair treatment. These are only a few of the various ways in which the manufacturer can spread the gospel of fair play to the electric railways. Mr. St. Clair of the association staff and Mr. Kelsey, publicity director of the Community Traction Company of Toledo, have made personal visits to many of the manufacturers in connection with this work. Response to these efforts has thus far been very gratifying. A series of colored posters which strike at different phases of the problem and drive important points home have been sent to manufacturers for use on factory bulletin boards. Special slogans have been suggested, such as: "The bus may be all right in its place, but not in the place of the trolley." A large number of manufacturers are co-operating and their efforts are sure to show results.

One railroad man has suggested that *Aera* publish an "Honor Roll" containing the names of the manufacturers who are showing evidence of the fact that they are taking an active part in the work of the committee. The idea is a good one and the list will appear shortly.

The report was interspersed with numerous anecdotes to drive the different points home and concluded with the plea that all companies make sure that they are doing justice to the job.

The report was signed by E. F. Wickwire, chairman; P. N. Jones, E. C. Faber, J. C. McQuiston and Frank Gale.

RAILWAYS SHOULD HELP

C. E. Morgan, Brooklyn City Railroad, in discussing the report, said that the report should cause the manager of every electric railway company to ask himself these questions:

"What have I done in the way of rendering assistance to these manufacturers or to their committee?

"Have I given the manufacturers located or represented in the territory served by my company the necessary ammunition to enable them to work among their employees, clubs, Chambers of Commerce and other bodies in our interest?

"What have I done within our own organization to create the spirit of co-operation among individuals in departments and with the public, so that our organization will be working with the all-together spirit and move as a unit in efficiently accomplishing the desired results?

"How can the manufacturers or other bodies bring about their results if we do not co-operate with them?"

"Can the operating official, with all sincerity, expect the manufacturers to be active in spreading education about the railway if he knows in his own heart that he is making no effort to put his own house in order by properly schooling his own forces? Consider the case of an ex-employee of a manufacturing company who has been taught to respect and appreciate the railway service in his city. He enters the service of the railway and finds that his fellow employees of the railway company know little or nothing of the objects that are to be attained. Or consider the case of a former employee of a railway company which has given no attention to this important matter and who enters the service of a manufacturer who has been and is continually bringing forward the necessities of the railway service. The mental attitude of the employee will sometimes cause the manufacturer to question the importance of the subject. Or picture the factory employee leaving work and boarding a trolley car after having listened to a talk or reading a shop bulletin pertaining to the railway. With this on his mind, he asks the conductor or motorman about this or that, but finds that the railway's representative does not understand what he is talking about and is unable to give him any information, other than perhaps that which concerns his immediate duties in connection with the operation of his car. The factory employee will begin to discount the good work that had been done by the manufacturer."

"Remember," Mr. Morgan continued, "there is no 'just as good' substitute for good will, when lost. It can sometimes be regained by expending a large amount of time, labor and money. Also, that there is no public utility that has opportunities compared with the electric railway in that the employees, such as conductors, motormen, inspectors and agents, are in daily contact with a great number of the population served. This being the case, had we not better keep in touch with the car rider and learn whether we are serving him to his satisfaction? Our employees, after all, are the ones who really mold public opinion. When asked a question about the street railway upon which they work, do they say 'the company' or 'our company'? To obtain proper results, every railway company should establish policies which will bring about a feeling of mutual confidence and a desire to co-operate in the minds of all its employees from the highest to the lowest, its patrons and the citizens of the communities served."

Results of Election

President.—C. D. EMMONS, president United Railways & Electric Company, Baltimore, Md.

First Vice-President.—BRITTON I. BUDD, president Metropolitan West Side Elevated Railways, Chicago, Ill.

Second Vice-President.—J. N. SHANNAHAN, president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

Third Vice-President.—FRANK R. COATES, president Community Traction Company, Toledo, Ohio.

Fourth Vice-President.—W. H. SAWYER, president East St. Louis & Suburban Railway, East St. Louis, Ill.

Treasurer.—BARRON COLLIER, president Barron G. Collier, Inc., New York City.

Members of the Executive Committee representing railway companies whose terms expire in 1925.—PAUL SHOUP, president Pacific Electric Railway, San Francisco, Cal.; JAMES P. BARNES, president Louisville (Ky.) Railway.

Members of the Executive Committee representing manufacturer companies whose terms expire in 1925.—H. D. SHUTE, vice-president Westinghouse Electric & Manufacturing Company, East Pittsburgh; A. A. HALE, Eastern Representative Griffin Wheel Company, Boston, Mass.

The reports on mail pay, national relations and of the joint committee of national utility associations were then presented. Abstracts of these reports appear below in the order in which they were presented:

MAIL PAY

The report of the committee on mail pay was submitted by L. H. Palmer, chairman. It said that in March the joint claims in the hands of the Post-Office Department and of the association were sent to mail-carrying companies. A number of returns have been received and the data contained therein are being tabulated. The answers, however, are not in very good shape, and this has required considerable additional correspondence on the part of the counsel of the committee. The coming year ought to see the completion of the tabulations and the presentation of the case before the Interstate Commerce Commission. In conclusion it might be said that the calculations so far received indicate that the electric railways are entitled to a further substantial increase in mail-pay rates.

The report was signed by the chairman and C. L. S. Tingley, J. K. Jeffries, Samuel Riddle, W. S. Rodger, R. A. Leussler, Gordon Campbell and H. D. Weatherwax.

NATIONAL RELATIONS

The work of this committee has been quite varied. In addition to a large amount of correspondence and many personal conferences conducted, attention was given to a number of matters before the Interstate Commerce Commission and committees of Congress.

One of the most important matters before Congress calling for the attention of the committee was the so-called Bacharach bill. The practical effect of this bill, if it had been enacted into a law, would have left entirely without remedy, in so far as a trial of the facts was concerned, except in the local courts, the adjudication of public utility rate matters. Other utility organizations also presented arguments opposing the bill and nothing has been heard from it since the date of the final hearing on June 8. In connection with the railroad interchangeable mileage book, the committee was instrumental, with others, in an amendment permitting the commission to exempt, either in whole or in part, any carrier where the peculiar circumstances shown to the commission should justify such exemption. This bill with amendment has since passed. The committee observes that probably many electric railway companies will desire to co-operate in the use of the interchangeable mileage ticket, provided it is issued at such a rate and under such rules and regulations as will not be injurious to their business.

The committee appeared before the I.C.C. in a proceeding calling for a decision of jurisdiction on the question of depreciation between the Columbia Public Utilities Commission and the I.C.C., the matter involving to a greater or lesser extent the general proposition of whether such account shall be controlled by the I.C.C. or by the public service commissions of the various states. At the time of hearing for general freight rate reductions, the committee filed a brief with the I.C.C., setting forth the situation as it touched the various classes of interurban electric railways. Electric railways have not been compelled by the action of the I.C.C. to reduce their freight rates except in a few special instances.

The committee sent out to member companies two circulars issued by the Department of Internal Revenue, relating to the transportation tax. It also supplied the joint Congressional Commission of Agricultural Inquiry with electric railway data which otherwise would have had to be supplied by individual companies at great cost. The committee gave evidence in Congress of the desirability in the revenue bill of 1922 of omitting the transportation tax. It also arranged for appearance in the I.C.C. hearing on the efficiency of power brakes, but it developed that the examiners did not intend to consider the kind of brakes used on electric cars. Reference was also made in the report to taxes under the transportation act of 1920 and the joint coal committee.

The report was signed by Charles L. Henry, chairman; W. R. Alberger, Arthur W. Brady, Henry G. Bradlee, C. D. Cass, B. C. Cobb, Samuel M. Curwen, John J. Stanley and Lucius S. Storrs.

NATIONAL UTILITIES ASSOCIATIONS

The Joint Committee of the National Utility Associations was organized in the latter part of 1920. Its membership is composed of from seven to nine representatives each of the American Gas Association, American Electric Railway Association and National Electric Light Association, and its purpose is to act jointly for the three associations named in matters where their interests are equally concerned and thus avoid the duplication of effort that would result from the independent action of each association. The officers of the committee are Randall Morgan, chairman; Sidney Z. Mitchell, vice-chairman; and Oscar H. Fogg, secretary. Among its active sub-committees are the following: Federal taxation, P. H. Gadsden, chairman; public utility fuel, J. W. Lieb, chairman; public utility financing, S. Z. Mitchell, chairman; public information, M. H. Aylesworth, chairman.

First among the matters of importance in which the committee has been active during the current year have been the questions of federal taxation, the bill introduced in Congress (H. R. 10212) designed to restrict the power of injunction by the federal courts, and the present and still serious coal emergency.

In the matter of federal taxation the commmittee approved the following program: First: Any sales tax passed by Congress should follow the example of the French and Canadian acts and exempt regulated industries. Second: If a sales tax is adopted it should provide sufficient revenue to enable the elimination of the existing surtax and excess profits tax on individual and corporate income. Third: On the question of the normal income tax the public utilities should urge that the normal income tax on public utilities should not exceed the present rate. This is in line with the report of the taxation committee of the Industrial Conference Board. Fourth: Any tax on undistributed earnings of corporations should be so worded as not to apply to earnings which are reinvested or held for reinvestment in the property within twelve months after the year in which they accrued, or which, together with the earnings distributed, do not exceed say 10 per cent return on the value of the property. Fifth: In the event the sales tax is not passed, an attempt should be made to have reduced the very high registers of the surtax on personal incomes on the ground that the present registers are so confiscatory that they are defeating the purpose for which they were created, namely, to raise revenue, and the longer they continue to exist in force, the more they will defeat that end.

The sub-committee has co-operated with various other national organizations which are opposed to the continued issuance of tax-exempt securities and are united in demanding an appropriate amendment to the Constitution, and the action of these organizations, the indorsement of Secretaries Houston and Mellon and the strong recommendation of the President demonstrate that public opinion has been aroused to the evil of this large volume of tax-exempt securities.

Representatives of the joint committee appeared in opposition to the Bacharach bill at public hearings held in Washington, and the sub-committee on fuel has taken an active part in the present coal crisis. In public information the activity of the three associations has been to some extent co-ordinated and it is felt that particular benefit has been derived thereby. These associations as well as the joint committee enthusiastically support the work of the state committees on public utility information and render them all possible assistance. Plans have been discussed for the more uniform preparation of statistical and other educational information by the national associations for the use of the state committees and in any other educational activity.

The report was signed by Randall Morgan, chairman; Britton I. Budd, Joseph K. Choate, Edwin C. Faber, Lucius S. Storrs and Robert I. Todd.

President Todd then introduced Hon. Walter W. Warwick, Assistant Director of the Budget, United States Treasury, Washington, D. C., to speak on the subject "Electric Railway Financing." Judge Warwick's address will be found on another page.

At the conclusion of Judge Warwick's address, Mr. Todd said that the part on the program known as "Past-Presidents' Day" had now been reached. He himself might perhaps use the salutation of the Romans "About to die I salute you." Nevertheless, this was not the actual situation. When a president returns to the ranks there is much that he can do of great value to the association, as shown by the services of the past-presidents. He then invited the past-presidents of the association to take seats on the platform. Those who did so, with their terms of office, were: John M. Roach (1899-1900), Walton H. Holmes (1900-1901), Arthur W. Brady (1910-1911), Thomas N. McCarter (1911-1912), George H. Harries (1912-1913), Charles L. Henry (1915-1916) and L. S. Storrs (1916-1917).

Mr. Todd then introduced Mr. Roach as the senior past-president and Mr. Roach welcomed the association to Chicago in behalf of the Chicago Surface Lines. He then explained that General Harries was in charge of the remainder of the session. General Harries then took the chair and asked the audience to stand as a mark of respect to those who had passed beyond. After a few impressive words on the past-presidents who had died, he introduced with a few chosen words each of those who were present. Each gave a short address.

In conclusion General Harries presented a gold watch fob to Thomas E. Crossman, the official reporter of the association. He explained that Mr. Crossman had been the official reporter of the association for forty years, having reported the first convention and all subsequent ones, and he paid a high tribute to his ability. Mr. Crossman replied briefly and the meeting adjourned.

Thursday Session

The final session of the American Association was called to order at 10:15 o'clock Thursday morning with President Robert I. Todd in the chair. The first order of business was the presentation of the report of the committee on education, which had been postponed from the Wednesday period. This report was presented by the chairman, Edward Dana of Boston.

EDUCATION

The committee's work this year was largely along ten lines, of which the first four related to co-operation with educational institutions and six to educational efforts within the railway company's organization. In speaking of co-operative courses with universities and colleges, the committee pointed out that a limited number of college men might be employed during the summers following the first three years at college, to take the places of the regular employees who were on vacation, but a much better co-operative plan would be to arrange a course throughout three or four years of the student's time at college, during which he would spend regular periods of from two to three months with the railway, going through a course of training in different departments. Both Massachusetts Institute of Technology and Harvard University have such co-operative courses with industrial concerns and the Massachusetts Institute of Technology has recently proposed a detailed course for the training of men for railways situated within three or four hundred miles of Boston. The University of Cincinnati and Marquette University also have successful co-operative course with electric railways.

Similar co-operation with high schools and trade schools in either day or night courses is desirable for the training of minor executives and skilled workmen. There are several such courses in the vicinity of Boston, and similar courses are available in other large cities. Street railways should take an active interest in seeing that their employees avail themselves of such facilities. Certain large manufacturing establishments serving the electric railway industry also have a co-operative plan for the exchange and development of promising young men. Arrangements have been made by which one or two such young engineers have worked as car inspectors, car wiremen or on testing work of various kinds for six months and young men in the railway employ have had the advantage of six months' training in manufacturing plants.

The state university extension plan is also available in most cities for training in mathematics, drawing and electricity. In one state the Department of Education offers a special course for the training of motormen.

Within the organization the report recommends that the supervisory force on an electric railway should have instruction in the fundamental economic problems of the industry in general and of the property employing them in particular. They will be better equipped to handle their own jobs and to grow into executive jobs, and some of the information that they gain will reach the rank and file of the employees and the patrons of the railroad they work for. Such instruction can be given by lectures from a specialist or specialists preferably from outside the railroad organization. The attendance should be voluntary, and the lecture followed by discussion. Such a course of study will show which employees are sufficiently interested in railway problems to be considered later for promotion to executive positions.

During the winter of 1921 and 1922 the Chicago Elevated Railroads arranged for such a series of lectures to be delivered by a professor of commercial economics. The average attendance was 152 and the management is so well pleased with the work accomplished that further efforts along the lines of a school for future executives will be made at once.

One excellent way of assisting in the training of executives is by company section meetings. In connection with this work, there is the opportunity of using the Question Box. Employees can be invited to submit such questions as they desire to have answered, and occasionally difficult problems reach a solution through this method.

There is little new to report on the provision of shop and departmental apprentice courses mentioned in the report on apprenticeship systems submitted to the Engineering Association in 1921. The tentative plan promulgated by the committee provides for the training of two classes of employees—apprentices and engineers. For the development of engineers the committee recommended the Schneider plan of co-operative education, which has been proved a success. A survey of the various systems of training for trades apprentices indicates that there is little hope for a standardized method of training which would meet all conditions found in the electric railway industry.

Much can be done in the distribution of company and association literature of an educational nature. Literature of this nature not only is of direct benefit but should have a psychological effect upon the employee to the extent that he would realize that his employer is taking an interest in him, and he in turn will take more active interest in the problems.

Electric railways that have any number of employees who do not speak English may well take up an Americanization program, the ultimate objective of which is that every employee shall understand, speak, read and write English and become an American citizen. Some excellent work along these

Looking North on Michigan Avenue, Chicago lines has been done by the Chicago, North Shore & Milwaukee Railroad.

Finally, there should be provision of instruction along the lines of courtesy to the public. In these days of standardized employment, the fostering of the spirit of courtesy is made rather more difficult by the fact that the individual employee does not feel that his reward is directly commensurate with his own effort. This really is not true, and an important task for the management is to make each employee realize that if he is courteous this fact will rebound to his own progress. While as a conductor a man may not be rewarded financially beyond the agreed-on wage scale, he does not need to remain a conductor all his life, but has ahead of him any opening up to presidency. He must somehow be made to realize this.

Under the head of "Existing Difficulties of the Present Situation," the committee says that the high schools, trade schools and the university extension departments report that the men already in the employ of electric railway companies do not enroll in the courses offered, while the universities and colleges report little interest on the part of students to prepare for work with the electric railways. On the other hand, the trade schools and high schools have done very little to study the ways and means of educating the present personnel of electric railways for higher positions. The courses offered by these schools are in all cases merely general courses in mathematics, drawing and science. Those in charge of courses at colleges and universities must be made to appreciate the possibilities and need for high grade engineering in electric street railway operation.

The greatest service which can be rendered at the present time is to bring together these two groups, the one responsible for the operation of electric railways, the other for the education of engineers and operators. The type of men desired for each position should be determined and stated as accurately as possible. Methods should then be inaugurated for the selection of men of the right type and educational plans drawn up for giving the men the necessary training and education. The educators should be educated concerning the opportunities which exist in the electric railway field and the training which men should have in order to fill these positions.

An appendix gives theses by committee members and others. Professor Norris briefly outlined what has been done in previous years. Professor Timbie explained the M.I.T. plan for training electric railway executives. A co-operative course in electric railways, similar to one which has been in successful operation for three years in electrical engineering in connection with the General Electric Company at Lynn and the Edison Electrical Illuminating Company of Boston, was outlined and the curriculum given. Mr. Von Phul suggested that the association establish a central research agency to consider employment methods somewhat like the work of the Industrial Relations Association of California. The association might also encourage the preparation of text books on electric railway methods and the placing of electric railway equipment in schools. C. S. Coler compared education to lubrication, which helps to create an understanding between the axle and its journal. A. E. Potter recommended that *Aera* publish a course of study lessons. M. B. Lambert recommended among other things the encouragement of study among employees by the publication of a pamphlet explaining why men failed to study after they leave the common school and by the establishment of a four or six-year educational course for all men who desire to enroll. Thomas S. Wheelwright told about the work done by the Virginia Railway & Power Company, including the educational work conducted under the direction of the Y.M.C.A. A summary of previous educational work done by the American Electric Railway Association and its affiliated associations is also part of the appendix.

The committee was: Edward Dana, chairman; Edward J. Blair, Thomas Finigan, M. B. Lambert, Henry H. Norris, F. R. Phillips, A. E. Potter, Thomas N. Schoepf, Edward A. West and Thomas S. Wheelwright.

DISCUSSION ON EDUCATION FOR ELECTRIC RAILWAY SERVICE

In discussion on this paper Prof. W. H. Timbie of the Massachusetts Institute of Technology, Boston, said that, being a more or less constant attendant at technical conventions, he was surprised here to find so few men from educational institutions. While he did not believe that a lack of attendance of college professors at the convention was the sole lack of success of the electric railway industry, nevertheless there was one thing which professors can do.

Railways, he pointed out, need both men and money. College professors form the last class from whom money might perhaps be obtained, but they do have an influence and touch with the best most "trained" minds in the world. Note, he pointed out, that he did not say "best" minds, but the best trained minds.

Professor Timbie went on to outline the work being done at the Massachusetts Institute of Technology in bringing in at the right time your college men to industries. In other words, the co-operative course between industries, that is railways, and educational institutions tends to bring the right kind of college men in contact with the utility and makes him available upon graduation.

Edward Dana spoke of the hope which he on the Boston Elevated had for good results to be obtained from the arrangement which the Boston Elevated made with the Massachusetts institute for co-operative work in training men.

The next order of business was the presentation of the report of the committee on trackless transportation by H. B. Flowers, Baltimore, chairman.

TRACKLESS TRANSPORTATION

The committee on trackless transportation reported its belief that all of the transportation requirements of any community should be furnished by one agency and that that agency should be the electric railway company. It alone has the trained organization and ripe experience required for handling passenger transportation problems and the development of any other agency would result merely in a duplication of service which could produce only a higher cost of transportation for the public. We have already to a large extent convinced the public that our business is a natural monopoly, as is evidenced by many rulings of state commissions in eliminating or refusing permits for duplicate service. Hence it is our duty, as public servants charged with the responsibility for conducting the highway transportation in our respective communities, to study and consider the availability of every feasible unit or method for furnishing this service.

Railless transportation is recognized by the electric railway industry as an aid to transportation if properly fostered, and is recognized by regulatory authorities as a menace unless properly supervised and controlled and required to pay its just share of taxes and public charges. The automotive industry is now producing vehicles of a design suitable for passenger transportation service. In the light of these findings the questions arise as to the economic and practical field of the railless vehicle.

It is recognized that the electric car running on rails is the most essential, reliable and economical method of urban, suburban and interurban travel, considering the transportation problem as a whole and especially for mass transportation. This condition arises largely from the fact that the operating cost per passenger is higher for bus operation than with electric cars.

There is, however, a field in transportation in which the railless vehicle can furnish service satisfactory alike in operation and economy; that is, where the traffic is so light that the higher cost per passenger of operating the bus is offset by the relatively high fixed charges per passenger with such light traffic, which result from the electric railway's investment in track. The possibility of utilizing the motor bus or trackless trolley should therefore be kept in mind by electric railway operators, either where they are confronted by the necessity of extending transportation service into sections where traffic will be light or in the economically similar situation of being required to rebuild tracks on a line where the traffic is too light to warrant the track investment. In the latter case the economic procedure might be to abandon the track and install bus service.

One of the most important matters affecting the cost of bus operation is that of special taxes or charges by states or municipalities for the wear on pavement or road surface caused by bus operation. This question is receiving every year more study by state legislatures and other governing bodies, resulting in many cases in recommendations or legislation increasing these charges. Governmental policy on this subject is still in too indefinite shape to admit of a general statement at this time, other than to say that the matter should be weighted in considering the adoption of railless transportation in any locality, and to recommend the further study of this phase of the subject by our association.

A committee of the Engineering Association was instructed to study the subject of railless transportation from the viewpoint of design, and has collected data which are on file at the headquarters of the association. The committee feels, however, that the development of motor and trackless trolley buses as adjuncts to the electric railways is still at too early a stage to warrant the recommendation at this time of standards of design. Individual companies must be governed by their local requirements, working in collaboration with the various manufacturing interests. A corresponding committee of the Transportation & Traffic Association has also collected valuable data which are on file at the association headquarters.

The committee has given some consideration to the effect of bus service upon the financial situation of the electric railways. The basic transportation service in any community is and will be furnished upon rails. Trackless service will be found supplementing but not competing with that of the electric railway. If the services of both means of transportation are co-ordinated, the net return of each will be reflected in the net return of the electric railway. New capital is annually required in the operation of a street railway. Part of this new capital may well be used in the development of trackless service in the field above mentioned. Present investment in the electric railway is thereby conserved, the growing demands for service met and the return to the investor stabilized.

In addition to the function of supplementing the street railway service at the same rate of fare, there has been found to exist in some of the larger cities a demand (at a higher rate of fare) for a transportation service in addition to the electric railway which shall insure a seat for every passenger. Such service is similar to that furnised by the Fifth Avenue Coach Company in New York and by others in Chicago, Baltimore and other cities. This service is furnished by buses; it costs more to furnish than the existing electric carfare will pay for, but it is believed to be proved, in this and other kinds of business, that the public is willing to pay a rate of fare which will compensate for the cost of the service it wants. Further study of development in the design and construction of railless vehicles and their adaptability for highway transportation should be carried on by an association committee.

The report was signed by H. B. Flowers, chairman; R. E. Danforth, W. J. Flickinger, S. W. Greenland, C. W. Kellogg, R. V. Miller, H. A. Mullett, D. W. Pontius, H. B. Potter and J. N. Shannahan.

DISCUSSION OF TRACKLESS TRANSPORTATION

In discussion on this work, Zenas Carter, of the White Company, Cleveland, Ohio, said that he realized from contact during the convention with electric railway men that this question is disturbing to many and vital to many. In a great number of cases the discussion had been inspiring, as viewed by a motor manufacturer, with reference to the constructive attitude taken by many electric railway officials. Mr. Carter pointed out that his company was confident from its study that electric railways need have no fear from the motor bus as a competitor or otherwise, provided electric railway men in their organization are alive to their responsibility to provide transportation in their community, in line with the report of the trackless transportation committee. Motor bus men agree fundamentally with the report. It is unfortunate only that in many places electric railway men have not wholly visualized their opportunities.

Mr. Carter went on to say that of course it is possible to transport in practically all cases passengers and freight at less cost by electric motor power than by gas. There are some exceptions in light traffic, of course, where the actual cost is less by motor vehicle. Electric railways have the exceptional opportunity of being the transportation people on the ground, and some of them have had wonderful foresight and vision, having taken steps five years ago in motor vehicle development because they realize the transportation possibilities.

Mr. Carter then went on to describe the Youngstown-Warren installation of the Pennsylvania-Ohio Electric Company, and the Milwaukee-Fond du Lac installation of the Milwaukee Electric Light & Traction Company, which have been described at various times in *Electric Railway Journal* and *Bus Transportation*. He pointed out that on the Pennsylvania-Ohio lines between Youngstown and Warren the company had been operating for some time and the average load factor over the period had been 73 per cent and on Friday and Saturday, Sept. 29 and Sept. 30, the load factor on this particular line was exactly 100 per cent.

W. H. McGrath, of the Puget Sound Light & Power Company, which owns the Pacific Northwest Traction Company operating in and around Seattle, Wash., said there was one phase of the trackless transportation business which had been omitted in the consideration by the committee. This phase was that of considering the improvement of the financial condition of the railways themselves. In addition to putting money in the stage business itself and in addition to whatever benefits may be derived therefrom the greatest benefit, judging from the experience around Seattle, is that from co-operation with the stage men themselves. There is a very definite field, particularly in those states where there is a provision for a certificate of public convenience and necessity for starting new transportation lines, which should not be overlooked. In Seattle, the company has adopted the policy of owning the trunk line facilities, both interurban and stage, and offers facilities to independent operators at the various terminals, ticket facilities, joint advertising of schedules, etc., and as a result there has been a great use of these depots by independent operators who bring in large numbers of passengers to the interurban lines. As a result there has been an improvement of 40 per cent in the net earnings of the interurban. This is a result of the operation during only the past six months. The policy of the company is to co-operate with the others. The result is more earnings to the interurban, more money to the independents themselves, and finally, a general improvement of the whole transportation condition of the community as a result of the example set by the company itself.

The next order of business was the presentation of the report of the committee to draft a proposed uniform motor vehicle law, presented by C. D. Cass, Waterloo, Iowa, chairman.

REPORT OF COMMITTEE ON UNIFORM MOTOR VEHICLE REGULATORY LAW

The committee undertook to study motor bus and motor truck operations with a view to recommending a uniform regulatory law that might be useful in formulating fair and effective motor bus and motor truck regulations. The proposed bill requires a certificate of necessity and convenience before a motor bus company can commence operation.

The study shows that there was no uniform method of taxing motor vehicle common carriers or of securing permits for operation. The committee held that inadequate taxation for the use of public highways results in a public subsidy for such carriers. With this viewpoint the committee determined that a ton-mile tax for all motor vehicle common carriers, whether passenger or freight, would provide funds of an amount that would represent the actual deterioration of the highways caused by this class of carriers.

The bill as drafted first defines a motor vehicle, then a motor carrier and a public highway. It vests the state utility commission with power to supervise the rates, accounting practices, schedules, etc., for all motor carriers. A certificate of convenience and necessity must be secured from the commission before any motor carrier can start operations. Revocation of a certificate can only be made by the commission after a hearing. It may be suspended, altered or amended, however, without a hearing.

Special rules are laid down for applicants filing petitions for a certificate. Taxes for the use of the highway are suggested on a ton-mile basis, the rate

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First Vice-President

C. D. EMMONS
President

J. N. SHANNAHAN
Second Vice-President

F. R. COATES
Third Vice-President

W. H. SAWYER
Fourth Vice-President

Newly Elected and Re-elected Officers and Members of Executive Committee

BARRON COLLIER
Treasurer

PAUL SHOUP

J. P. BARNES

H. D. SHUTE

A. A. HALE

Members of Executive Committee with Terms Expiring in 1925 being lower for pneumatic tired vehicles. For purposes of assessing this tax, motor carriers are required to keep a daily record of vehicles in operation or laid up for repairs, as well as the ton-miles of travel for both passengers and freight. These records are to be filed monthly with the commission under oath.

The bill also requires that liability insurance be taken out before a certificate is granted, in such sum as the commission may determine, adequately to protect the interests of the public with due regard to the number of persons and amount of property involved. A bond is also required conditioned on the payment of all fees, taxes or charges which may be due the state.

The commission can promulgate such safety rules and regulations as it deems necessary to govern and control the operations of motor carriers in the state and to enforce them by penalties. Motor carriers are required to maintain their vehicles in a safe and sanitary condition. Drivers shall be at least twenty-one years old, of good moral character and competent to hold a regular chauffeur's license from the state motor vehicle department. The speed of operation of passenger buses is limited to 25 m.p.h., and the freight trucks to 20 m.p.h. Accidents must be reported to the railroad commission. Violations of the law will be considered as a misdemeanor and punishable by fine not exceeding $1,000 or one year imprisonment or both.

H. V. Bozell, New York, asked whether the committee had given any consideration to the inclusion of a gross receipt tax as one of the methods of taxing motor vehicle common carriers. C. D. Cass answered that the aim of the committee had been to make the law as simple as possible and to indicate that naturally the motor carriers could be expected to pay for the destruction to the highway, and it seemed more practicable to approach the question from the standpoint which the committee did. Garrett Seely, Youngstown, Ohio, raised two questions with reference to the report of the committee. The first was that any regulation which may seem to impose heavy burdens upon the motor carriers may some day come back to plague those railways who go into the business themselves. Second, that the amount of the tax seems heavy. With the six motor coaches now being operated between Youngstown and Warren on a 15-mile run, it would be necessary, according to this bill, to pay $25,000 per year, which, pointed out Mr. Seely, would certainly pay the entire cost of the maintenance of the highway and put no charge against any other vehicle using it whatsoever.

Thomas N. McCarter, Newark, N. J., said he wished to extend his sympathy to any committee which tried to pass this law in the forty-eight states of the Union.

A. W. Brady, Anderson, Ind., said that the objection to the provision because it might react on the electric railway industries using buses was not valid because the matter should be approached from what was proper no matter who was operating the vehicles. Mr. Brady said he thought that this form of charge against the commercial vehicle was coming to be recognized as the proper one. With reference to the cost—the actual figure—there was naturally some question, but this could be worked out on an engineering basis later, certainly.

L. S. Storrs, New Haven, Conn., pointed out that the method of arriving at the tax suggested by the committee was now in operation in Maryland on a ton-mile basis on freight vehicles, and on a seat-mile basis on passenger vehicles.

Walter Jackson, New York, said that there was one feature which was overlooked and that is that from a historical standpoint if a tax is levied only on account of wear the state would not get much. What the public has always done is to tax transportation facilities for its revenue on a gross receipt basis or something like that, and that appeared to be logical in view of past developments.

Another point which Mr. Jackson mentioned is that the motor stage as operated by Mr. Seely and Mr. McGrath is really an enlarged limousine which in its actual operation is eliminating the inefficiently operated private car, and actually this motor vehicle will not do as much damage to the highway—will not wear the highways so much—as the inefficiently operated private cars would do which it drives from the highways. Mr. Jackson said that a per cent on gross earnings or a per cent on net earnings or a gasoline tax should certainly be used in this problem.

Mr. Flowers said that according to the Maryland method of charging, Mr. Seely, on the basis of twenty trips per day, would have to pay $28,064 per year. In Baltimore, the company has to pay $2,524 per year per bus for the double seaters.

C. L. Henry, Indianapolis, said that the study now going on in Indiana in co-operation with the farmers has led to the proposal of almost the same bill, and the approach had been from an entirely different angle. This, he said, justifies the committee. On motion by Mr. Henry, the association approved and adopted these reports.

COST OF CONSTRUCTION OF HIGHWAYS

The report of the committee on cost of construction and maintenance of highways was then presented by Chairman Harvie. The committee was not appointed until last June, so that it was able to make only a progress report. It has not yet received replies to all the questionnaires sent out. When these are received a compilation and study of the facts will be made.

President Todd then introduced Hon. Carl D. Jackson, chairman Wisconsin Railway Commission. His address in abstract will be found on another page.

At the conclusion of Mr. Jackson's address, President Todd introduced Hon. Marcus A. Dow, of the New York Central Lines and National Council of Safety, who said it was a great privilege for him to address the association. He said the first question apt to be raised in connection with a safety campaign was: Will it prevent accidents? This can be answered unqualifiedly, Yes. It will conserve life, increase efficiency of operation and reduce human sacrifice. This has been shown many times. St. Louis had probably the first safety week. This was in 1918 and the results were so markedly favorable that a permanent organization was founded to promote safety work in St. Louis. The speaker gave statistics as to the reduction in accidents which had been accomplished, divided into different classes of hazards such as school children, industrial accidents, etc. He then gave similar statistics for Milwaukee and Detroit. The New York Central Lines, by their safety campaigns, have cut accidents in half between 1913 and 1921, when measured on a unit basis. They have had safety committees, education of employees, and have built up a great safety morale. The same principle applies to electric roads. A company can do no greater service to a city or to its own interests than to support this matter. The speaker then gave statistics of accident reduction through safety measures on a number of electric roads, as supplied by the National Safety Council. He concluded by pointing out the great advantage in the saving of time which resulted from this movement.

Mr. Emmons then read a telegram from Charles M. Schwab, expressing his regret at not being able to be present at the meeting and declaring he was optimistic on the business situation.

W. J. Harvie, chairman committee on electrolysis, presented that report. He said it was a progress report only. As explained in last year's report the committee had developed considerable data which were at the disposal of members. During the last year certain phases of the question at hand closely related to the matter of electric railway power distribution and generation had come to the attention of the committee, and it had seemed best to place this phase in the hands of the engineering association. That association, therefore, was requested to place this matter on its program.

Thomas N. McCarter, chairman committee on resolutions, then presented resolutions expressing the regret of the association on the death of several prominent members, expression of thanks to the committees on meetings and subjects, exhibits, entertainments, and safety, to the speakers, officers and members of the executive committee, members of organization staff, technical press and others.

INSTALLATION OF OFFICERS

Mr. Todd then asked the newly elected officers to mount the platform, and asked Arthur W. Brady, Anderson, Ind., to introduce them to the association. Mr. Brady said it was a great pleasure for him to do this and referred to the fact that while three of those standing on the platform were officials of roads in Indiana and the newly elected president was not, yet Indiana was proud that for many years he had been the general manager of an Indiana electric railway. Mr. Emmons expressed his appreciation for the honor accorded to him. He then asked for co-operation of all during the coming year by saying that he believed that it would be a very constructive period. He then earnestly urged those who would accept committee appointments to be present at committee meetings.

As Mr. Budd was absent Mr. Shannahan was next introduced and urged that the new officers receive all possible support from the members of the association.

Mr. Coates, who has been elected third vice-president, pledged the support of all and urged particularly the securing of new members.

W. H. Sawyer, president East St. Louis & Suburban Railway, spoke of the association as having had an illustrious past and said that it was his ambition not only to continue this high standard, but also to take such action as might be necessary from time to time so that the association would meet changing conditions and the members could give that satisfying and satisfactory service that was necessary.

Mr. Collier, the treasurer, was introduced with words of commendation for the treasurer's report and said that he was pleased that it was satisfactory. The meeting then adjourned.

Last Meeting of Outgoing American Executive Committee

The last regular meeting of the outgoing executive committee was held Monday morning, Oct. 2, at the Drake Hotel in Chicago.

Executive Secretary J. W. Welsh, in giving his financial report, showed materially less unpaid dues at the end of this year as compared with the end of 1921. He also reported upon the basis of actual expenditures for ten months and two months estimated, a surplus of substantial proportions.

The report of the finance committee presented by Mr. Barry indicated the business-like manner in which this committee and the executive secretary had conducted the business affairs of the association during the past year. Quarterly audits have been made; personal supervision by the finance committee over expenditures and vouchers have been made; the office force has been kept on a small and business-like basis and the final result shows a healthy and desirable surplus which makes for stability in the operation of the association's affairs. The committee examined into the question as to whether or not there should be modification of dues and recommended that the association continue to operate under the present system of dues.

The report of the policy committee presented by Mr. Budd recorded the questions of policy which had been referred to the committee and showed the effectiveness with which the American executive committee was keeping in contact with the affiliated associations, particularly in their relations and joint activities with other societies.

A report was received and approved from the subjects and meetings committee for recommendation for the incoming executive committee for the coming year.

After extensive discussion on the question of the relation of interurban electric railways to the national transportation act, the executive committee authorized a special sub-committee of the national relations committee to handle this particular question in Washington. After extended informal discussion on various matters for the convention the committee adjourned.

Those who were present at the committee meeting were President R. I. Todd, Vice-Presidents Budd, Emmons, Coates and Shannahan, and Messrs. Kimball, Palmer, Sawyer, Arkwright, Chubbuck, Gould, Trontrup, Barry and Finigan, and Past-Presidents Brady and Henry and Executive Secretary J. W. Welsh. W. V. Hill was present for Paul Shoup and Carl Beck for C. R. Ellicott.

First Meeting of the New American Executive Committee

The first meeting of the new executive committee of the American Association was held at the Drake Hotel in Chicago on Thursday afternoon, Oct. 5. The first business before the committee was the election of an executive secretary, and to this position J. W. Welsh was re-elected by a unanimous vote.

The resignation of W. H. Sawyer, fourth vice-president-elect, as member-at-large representing operating companies was received and accepted and a committee appointed to nominate a successor for consideration by the executive committee at its next meeting. President Emmons appointed on this nominating committee W. H. Sawyer, H. E. Chubbuck and L. S. Storrs. Upon request of President-elect Wallace Muir of the Claims Association, the constitutional amendment to the Claims Association constitution redefining the objects of the association, which amendment had already been adopted unanimously by the executive committee of the Claims Association, was approved.

Invitations Received for 1923 Midwinter Conference

W. R. Alberger, Oakland, Calif., presented a personal invitation of the California Electric Railway Association to the American Electric Railway Association to hold its midwinter conference in 1923 in California, at Del Monte. The invitation suggested that the holding of the conference in California be augmented by a special trip of inspection of California and California electric railways. An invitation was also received from J. H. Hanna of Washington, D. C., to hold the midwinter conference in Washington. After much discussion the committee voted to request the subjects and meetings committee, which has this question in hand, to give serious consideration to holding the meeting in California.

Invitations were read from electric railway officials and city officials in Buffalo, N. Y., to hold the 1923 annual convention at Buffalo, but no action was taken, as this is a matter to be considered by the committee on locations.

W. J. Harvie presented a progress report of the joint committee on electrolysis, the committee approving the action Mr. Harvie and his associates from this association have taken to date.

E. J. Blair made a report for the exhibit committee, details of which will be given when final figures are ascertained. The executive committee voted to tender a vote of thanks to Mr. Blair for the excellent way in which the exhibits were handled. At the request of the committee, E. M. T. Ryder, of the Engineering Association, and H. L. Whittemore, of the Bureau of Standards, appeared to discuss details of the request of the engineers for an appropriation for rail joint research. After considerable discussion the executive committee voted an appropriation of $10,000 for the purpose and instructed Executive Secretary J. W. Welsh to solicit with the approval of the executive committee an additional $10,000 from such railways and manufacturers who have an especial interest in this subject.

The committee also voted to authorize C. L. Henry, chairman national relations committee, and Executive Secretary J. W. Welsh to attend the annual meeting of the National Association of Railway and Public Utility Commissioners at Detroit during the week of Nov. 14.

The committee decided to hold its next meeting in New York on Friday, Nov. 24.

Those in attendance at this very full meeting of the executive committee were: President C. D. Emmons, Vice-Presidents B. I. Budd, J. N. Shannahan and W. H. Sawyer; Past-Presidents George H. Harries, C. L. Henry, A. W. Brady, L. S. Storrs, R. I. Todd; Presidents Affiliated Associations Wallace Muir, Garrett Seely, L. C. Datz and W. G. Nicholson, and following members at large: J. P. Barnes, H. E. Chubbuck, J. G. Barry, L. E. Gould, A. A. Hale, and W. H. Heulings for S. M. Curwen; M. B. Lambert for H. D. Shute; Carl Beck for C. R. Ellicott, Executive Secretary J. W. Welsh, and the following guests: W. J. Harvie, W. R. Alberger, W. V. Hill, L. H. Palmer, E. J. Blair and Labert St. Clair.

T. & T. Association Proceedings

The Session Was Devoted, Principally, to the Following Subjects: Promoting Sales, Traffic Regulation, Safety, Car Design from a Traffic Standpoint, Training of Personnel, and Interurban Problems

L. H. PALMER

THE first session of the Transportation & Traffic Association was held Oct. 2 when President Palmer called the meeting to order at 2:40. After announcing that the constitution requires the president to present an address, President Palmer reviewed the work of the association and pointed out directions in which he believed it could be of even greater benefit to the industry. Some of the high points of this address are given below.

PRESIDENT PALMER'S ADDRESS

In his presidential address L. H. Palmer spoke first of the efforts which had been made by the committees of the association to visualize the important problems facing the industry and concretely to point out effective methods of meeting and solving them.

In commenting on the work of the committees he commended the committee on safety upon a strenuous year's work, referring particularly to the exhibit at the convention. As to merchandising transportation, he pointed out that the first duty of a company is to give good service, although the "wares" of the electric railway must be popularized. If good and desired service is given, first and always, it can be consistently talked about. An element in merchandising is a proper personnel. The field for study here is so great that it is hardly yet comprehended by the electric railways.

Referring to the suggestions made in the presidential address last year by R. P. Stevens, Mr. Palmer said that these recommendations had been carefully considered by the executive committee and adopted in large part. One suggestion, that there be but one vice-president and a larger executive committee, was not adopted because it appeared to be unwise to change the form of the organization. As to the suggestion that association work be started promptly, action on this is well under way. Plans are in hand to have committees appointed promptly after the convention, to have their work started at once and a meeting held not later than Dec. 1.

On his own behalf Mr. Palmer suggested that a special committee be appointed to increase the individual membership in the association, by means of printed matter, letters and personal contact. The membership should be doubled during the coming year. Calling attention to the fact that last year the association adopted a classification of freight expense accounts, recommending that it be put in effect on member roads as of Jan. 1, 1922, he said that it should soon be possible to secure statistics in this field on a comparable basis. The subject should be followed up during the coming year.

Another suggestion was that in nominating and electing future officers, and members of the executive committee this be done with due appreciation of earnest work accomplished by members.

Mr. Palmer also expressed his thanks for the wholehearted co-operation received from the technical press, the association office and the railway companies in Chicago.

In closing, he said that the success of electric railways in the future lies in dealing rightly with the public we serve. Here is the work of the Transportation & Traffic Association. It is almost entirely through its members and their subordinates that this contact comes. In the nature of things the mechanical departments do not have that direct touch with patrons. The transportation men must sell the service to the car rider. They must be trained, encouraged, schooled and guided in the best methods of accomplishing this. On the shoulders of the transportation department rests most largely the burden of obtaining and holding good public relations. A good salesman sells his customer what the latter wants, he sells the selfish interests of his customer; that is, he tries to meet his views and fit his product to them. This psychological problem must be studied constantly and the men trained in accordance with its needs.

Better service to patrons and to the communities in which the railway operates is the great aim. The last year has seen a partial re-establishment of the electric railway business in the position it formerly occupied in community life. The high place previously held has not yet been gained, but the future promises better times and better business. It is for electric railway men to read these portents aright; to start on the hopeful upward path, and with clear vision pick their way to better things.

GARRETT T. SEELY

At the conclusion of the address the president said that the report of the executive committee would be printed and distributed among the members in due course and then called for the report of the secretary.

REPORT OF THE SECRETARY

Secretary J. W. Welsh, in his annual report, outlined the activities of the six committees of the association, stating that their personnel totaled seventy-one members and that the committees had held fourteen meetings during the year with a total attendance of fifty-nine.

A number of data sheets were sent out and co-operation was maintained with the National Safety Council, the National Electric Light Association, the American Gas Association, the International Traffic Officers' Association, and the American Engineering Standards Committee. On Sept. 15 the number of individual members was 106. The secretary referred to the successful exhibit held under the auspices of this committee during the year.

President Palmer then announced the following convention committees:

Committee on resolutions: P. E. Wilson, Cleveland; H. V. Bozell, New York; Claud Van Auken, Chicago; F. G. Buffe, Kansas City; E. M. Graham, Bangor.

Committee on nominations: Samuel Riddle, Louisville; D. E. Parsons, East St. Louis; S. S. Crane, Altoona.

There was then a four-minute address on safety, given by Fred M. Rosseland, chief of the public safety division of the National Safety Council. Mr. Rosseland briefly set forth the claims of this important subject, saying among other things that he recently had an opportunity of doing considerable work with the association committee on safety and he complimented the association on the excellent report of this committee. He pointed out that the money spent for claims was the only item of expense for which the railways did not get a direct return and the economic advantage of safety, irrespective of its importance from the viewpoint of public relations. He declared that a company was not efficiently operated unless safely operated.

The report of the committee on merchandising transportation was then presented by E. M. Walker, chairman, who read an epitome of each of the contributions. An abstract follows:

Merchandising Transportation

The committee declared that selling transportation, like selling anything else, is based on good service, fair rates, fair treatment, enthusiasm, integrity and work. The report took the form of a series of articles by the several members of the committee on methods by which the use of transportation can be increased by salesmanship. No special recommendations were made by the committee as to practices and methods to be followed, the reason being that there are as many methods of salesmanship as there are salesmen, and circumstances, which are always changing, suggest changes in methods. An abstract of the various contributions follows:

W. R. Alberger, San Francisco-Oakland Terminal Railways, described the restaurant service on the ferry boats operated by that company between Oakland and San Francisco. News stands and boot-shining stands are also operated by the company. No increase in price for restaurant service was made during the war. The net returns of the commissary department increased from $29,928 in 1917 to $121,876 in 1921. This latter figure represents 22 per cent of the net receipts during the same year.

W. H. Boyce, Beaver Valley Traction Company, gave results of the use of the zone system and the pass system on that property. (Further particulars will be found in the *Electric Railway Journal* for April 9, 1921, and April 22, 1922.) There was an increase in gross business on the whole system of 23 per cent after the fare was reduced from 7 cents to 5 cents. The passes proved popular, and so far 80 per cent of the revenue received from the sale of passes has been an increase in revenue. As the company was not bothered by jitney competition, this new business was secured either from pedestrians or people formerly riding in privately owned automobiles.

F. W. Shappert, Chicago, North Shore & Milwaukee Railroad, described briefly how passenger and freight business on that line had been increased by personal solicitation and service.

V. S. Curtis, The Connecticut Company, pointed out that electric railway companies in New England had successfully met jitney competition through educating the public as to the fly-by-night character of the jitneys and the essential nature of the railways. When jitneys begin operation they have a certain popularity, but when they reach the stage of development where they threaten the regular service rendered by the railways, the public finds them detrimental to its interests and deals with them accordingly. In Connecticut the jitneys have been put under the control of the Public Utilities Commission and made common carriers.

F. C. Lewis, Boston & Worcester Street Railway, described that company's methods of increasing its freight business. Some of his suggestions follow: Frequent and safe movement of shipment is more desirable than fast movement. The schedule should be regular. Shipments should not be split, that is, loaded part on one car and part on another. Patrons should be notified promptly of arrival of shipments. The rate schedule should be such as to attract business. The method of accounting, including the way bill and billing system, should be systematic. Much depends on the tactfulness of the solicitor and the personnel of the rest of the organization. The attitude of the road toward the public should be one of courtesy and patience. Even a businesslike answer, if curt, sometimes gives offense. Advertising should not be overlooked. In advertising, the company has made a feature of the fact that the cars save the highways as compared with motor trucks.

A. Stuart Pratt, Stone & Webster Management Corporation, described how a street railway on the Pacific Coast used advertising to encourage auto drivers to use the cars. The advertising consisted of short items placed in the reading matter of the papers on the fundamental theme: "The street car is the surest, safest and most economical form of conveyance; use the street car and save money." This advertising was resented by the automobile dealers who asked that it be discontinued. The manager offered not directly to refer to automobiles in these advertisements but continue them along strict "economy" lines. This was not satisfactory to the dealers, who began to advertise to knock the street car. A typical paragraph read: "In stormy weather, the automobile, for business use, appears at its best. No waiting in the wet, no tramping through water if you drive your own car." This advertising on the whole was helpful to the railway, as it got the public interested. Some arguments which may be used for the car are as follows: The tires wear out. Cost of insurance. Auto may skid. Auto may be stolen. Cost of ride $1. Let wife have use of car. Difficulty in parking auto. Bank account vs. auto. Standing in sun or snow rots auto top. Autos run out of gas. Save auto for real pleasure trips. Avoid traffic worries. Cost of one tire. Garage bill cut by winter storage. Meet neighbors on car. Cost of repainting. Other fellow a careless driver. Auto depreciation.

Samuel Riddle, Louisville Railway, pointed out that the agency of increasing sales through employees has not been utilized to the extent that is practicable and profitable until recently. The principles of such salesmanship can be explained to the employees, particularly to the platform employees, at employees' meetings. It can be shown that a car not on time results in loss of revenue, that the short haul is the profitable haul and that the man who wants to ride only a few blocks will not wait for a car. The employees' magazine further enables the expression of the company's plans, policies and achievements. When an employee makes a practicable suggestion for the improvement of service, it should be published in the employees' magazine with proper credit.

K. A. Simmon, Westinghouse Electric & Manufacturing Company, laid stress on the way to make salesmen of employees. During the training period the employee acquires a general knowledge of the property, community and industry as a whole, means of competing transportation, appreciation of car riders' characteristics, feeling of personal responsibility and knowledge of the service expected. He also learns a courtesy code. Too little attention, however, has been given to the period after training. The training should be followed up by observations on performance, guidance, recognition of good service, or unusual performance and provision of incentive for better service. Mr. Simmon prepared a synopsis of these various steps.

S. L. Vaughn, Grand Rapids, Grand Haven & Muskegon Railway, described how shipments are made by combination boat and trolley routes from Chicago, Grand Rapids and other points in Michigan, and J. B. Stewart, Jr., Youngstown Municipal Railway, described the use of the weekly pass on that and other properties, and methods of introducing it.

E. M. Walker, Terre Haute, Indianapolis & Eastern Traction Company, emphasized the value of the one-man safety car in merchandising transportation, and Harold B. Weatherwax, United Traction Company, Albany, gave pointers on the proper ways of developing a summer resort business. A good and well-located park is an asset, but there are many pitfalls to be avoided, because it is very difficult to revive a park once it has become unpopular. Retrenchment in attractions to save expenses has been one cause for unpopularity. Another is poor management. Resort management is really a highly skilled profession. Satisfaction and good spirit among the concessionaires are also essential for a successful resort. Good policing is essential.

The report contained many reproductions of advertising posters, etc., which had proved successful and were signed by the members of the committee, whose names have been mentioned as contributing independent articles.

The chairman then introduced Edward Hungerford as one of the speakers to discuss the report. He spoke of Mr. Hungerford as a prominent writer in the popular press and also referred to his connection for a number of years with the Brooklyn Rapid Transit Company where he had charge of the department of public relations for that company. The address by Mr. Hungerford is published in abstract elsewhere in this issue.

Edward C. Spring, Lehigh Valley Transit Company, read a paper on methods of increasing interurban business. He said that the basis of all business is service and that the companies should be sure that the public understands the usefulness and needs of railway service and the economic laws that govern its conduct. The interests of the electric railways should be safeguarded by those who believe in progress. The American public always wants something a little better than it asks for and the company that caters to these demands is the one that will make a hit with its patrons. Mr. Spring believed in encouraging the public to write to the company on all matters and that every letter should be answered quickly, fully and courteously. He referred to a series of prizes offered by a certain company for the best answers to the following questions:

What do you like least as regards the service and why?

What do you like best as regards the service and why?

What other service would you like to see installed and why?

F. W. Brown, Michigan Railway, read a written communication. He said, in part, that the lesson to be drawn from Mr. Alberger's paper is not only that increased revenue can be obtained from by-products (so-called), but by doing so the convenience and comfort of patrons is greatly increased. When it is possible to increase the gross revenue nearly 25 per cent. and without an enormous initial investment and without any hazard, such opportunity should not be overlooked.

Unfortunately, a great many lines are not of a character to permit of similar additions to their service, but there are other opportunities which are open to all lines. One is that a class of employees be engaged who are thoughtful and interested in the comfort of their patrons.

As to meeting motor-bus and truck competition, Mr. Brown said that they are a development of the times and introduce a condition which must be met. However, there should be no let-up in the efforts of the electric railways to have the buses and trucks regulated. Recent legislation in California places the bus and truck operators entirely under the jurisdiction of the California Railroad Commission.

Truck and bus lines acting as feeders to electric lines are desirable. Therefore, if legislation could be enacted that would require their operators, when they wished to enter the field either in competition with lines already established or as feeders to such, first to secure a certificate of necessity and convenience before they can begin such operation, this would make it possible to eliminate competition and duplication of service in a great many instances.

It is a mistake to lower rates and fares to meet such competition, with the thought in mind of making it unprofitable for the bus or truck lines to operate. One of the best methods of meeting this competition is entirely through service. There is a certain amount of travel that will go to the bus regardless of what the other lines may offer.

Not many years ago electric lines confined their freight operations to their own immediate territory. A few exceptions existed where connecting electric lines extended their through freight service over two lines, but rarely beyond the 200-mile limit. It was also a general practice to maintain a rate higher than that existing among competing steam railroads. The thought was that on account of the quicker service by electric lines than steam the traffic, or at least a portion of it, would still flow to the electrics on account of superior service. In some cases the rates were not only higher but four classes were maintained against six on the steam lines.

The traffic manager realized that the maintaining of higher rates was a disadvantage, and electric lines are now careful to maintain the same rates as those existing on steam lines. This has resulted in a decided increase in the amount of business and has overcome the loss sustained in the lowering of the level of rates.

Again, the motor truck came into competition, confining itself to a large extent to short haul. The electric lines immediately felt the effect of this competition, as the truck had the advantage of picking up a shipment at the consignor's door and delivering it in front of the consignee's place of business.

To meet this competition through competitive rates for long distances have been established, as in Michigan. Here one of the difficulties encountered was the dividing of the revenue among many carriers. This has been overcome and a division sheet established, giving to the originating and terminal lines a minimum of 20 per cent, while each intermediate carrier gets a constructive mileage of 50 when the actual mileage is in excess of 50 miles.

The other means of meeting truck competition is by absorbing drayage charges. The trucks pick up at the door of the factory and deliver at the place of business of the consignee, where again the electric line is placed at a disadvantage. In order to meet the changing conditions, some plan must be devised whereby this advantage can be overcome. It might be possible to agree to absorb drayage charges when shipments are large.

Providing facilities equal to those furnished by competitors is not confined entirely to fast service and competitive rates, but include terminal facilities, such as adequate warehouse room and truck room.

Thus far electric railways have confined their activities to shipments that can be moved in ordinary box or flat car, with few attempts to provide insulated cars to protect shipments against either heat or cold. This phase of the business might well be given consideration in view of the development of the freight transportation as an important part in the gross revenue of the electric railways.

ROUND TABLE ON WEEKLY PASS

At this point President Palmer turned the meeting over to G. T. Seely, Youngstown, Ohio, for the purpose of conducting a round-table discussion on the weekly pass. The first speaker was E. M. Walker, Terre Haute, Ind. He gave as the main reason for adopting the pass in Terre Haute the hope of securing all of the travel of the man who was dividing his rides between the street cars and jitneys. He said the pass had been effective in this respect insofar as the jitneys were competitive. On account of the coal strike which seriously affected the amount of traffic in Terre Haute, and also because of the strike of railroad shop men, it had been impossible to tell definitely what influence the pass had had on the amount of riding. However, an analysis of the traffic figures of the company for the past five months as compared to the corresponding period last year, led Mr. Walker to believe that the amount of riding had been maintained higher than would have been the case without the pass. Mr. Walker emphasized the value of the round sum of $1 for the weekly pass as being a very convenient selling figure. He said that he had found that instead of people buying passes for the sake of riding promiscuously, they were careful to figure out whether they would have use for more than twenty rides before buying a pass. Mr. Walker said that 12 per cent of the total riders were using the pass and producing approximately 15 per cent of the revenue. He said he considered the pass the only known method of giving the wholesale user a wholesale rate for transportation.

S. W. Greenland, Fort Wayne, Ind., stated that contrary to the usual circumstance, the reason for introducing the weekly pass in Fort Wayne was to reduce the amount of revenue, as the company had earned the full allowed 7½ per cent during the previous year. However, the pass had increased the revenue rather than decreased it and the company was now faced with the necessity either to sell the pass for a lower sum, perhaps 85 cents, or decrease the cash fare rate.

J. R. Blackhall, Chicago & Joliet Electric Railway, spoke particularly in regard to the use of monthly passes or identification cards which carry a small primary charge with the privilege of riding for 5 cents when the basic fare is more than that amount. He said prior to 1912 the fares were 5 cents with six tickets for 25 cents and fifty tickets for $2. At the time a new franchise was granted the requirements for the sale of tickets was discontinued. He did not think there has been any resulting loss in traffic. The straight 5-cent fare was continued until 1918 when it was raised to 7 cents and in 1919 it was raised to 10 cents. On Jan. 1, 1922, when a reduction in fare became necessary it was decided to continue the 10-cent cash fare and sell monthly identification cards for 75 cents, entitling the purchaser to ride as often as he desired during the month on the payment of 5 cents per ride. For the first nine months of 1922 the sales were as follows: 2136, 2408, 2386, 1216, 1978, 1845, 1689, 1644, 1720. The speaker believes that the decreased sales during the last five months were due to industrial conditions that prevailed during that period in Joliet.

There is no convenient way of segregating the car card fares from the half fares paid by children to determine the average rides per month per card, but as nearly as can be estimated the rides per month average forty-eight and the average fare per customer has been reduced from 9.62 cents in 1921 to 8.64 cents in 1922. Mr. Blackhall believes the system has some advantages over the weekly pass, particularly in that it provides a lower fare for those who do not have to ride very often.

The circumstances leading up to the adoption by the Tacoma Street Railway & Power Company, Tacoma, Wash., of the weekly pass were outlined by G. W. Rounds. During the last few years the fares were increased from 5 cents, first to 7 cents and then to 10 cents with twenty-five tickets for $2. The public did not take unkindly to the higher fares although the riding fell off even though gross earnings increased. There was also some jitney competition. In order to make the lines more popular, to induce riding, and to still further increase revenues it was decided to introduce the pass.

Commencing one week prior to the sale of the passes they were advertised in the daily papers, by posters on the car windows, and in other ways. The use of the pass was started on July 21. Prizes of $5 and $3 had been offered to the trainmen for the largest and next largest number of passes sold. The first week's sale of 7,000 was far above expectations. Since then the pass sales have gradually increased until the number now in use has reached 10,000.

The day of greatest sale is Monday and as high as 75 per cent of the week's passes have been disposed of on that day. The fact that they are sold for an even dollar greatly facilitates their handling.

A detailed record is kept for the passes handled by each conductor. In this way dispute can be avoided with trainmen, as they are required to report the serial numbers sold daily and any discrepancy can be easily detected.

An additional clerk was needed to keep the detail record of the pass sales, but this was offset by one released as analysis of receipts and ticket counting was combined. The clerk formerly handling metal tickets had been able to devote half his time to miscellaneous work, so the company has saved half of a clerk's time in the auditing department, and increased pass sales should enable a further saving.

A few difficulties have been met in the operation of the pass, such as passing it out of the car window, the display of a card of the same color as the pass, and by partial display of a split pass. Troubles of this kind are few, however. So far as can be determined the financial results have been good. Certainly riding has been stimulated, especially during the noon hours and evenings, when more revenue passengers are being carried. The jitneys, however, are still carrying heavy loads, especially during peak hours. A large amount of short-ride traffic has been secured, however, and in many outlying districts automobile owners have given up the use of their cars except for purely pleasure purposes. Salesmen, telegraph messengers, and many other classes heretofore traveling in automobiles, on bicycles, etc., are daily making use of the pass.

The average rides per pass per week to date have been 27.59; per day, 3.94; per week-day, 4.07; per Sunday, 3.15. The apparent revenue per ride on the pass is 3.62 cents and the true average fare per ride (including allowance for transfers) is 4.71 cents.

The railroad shopmen's strike has affected the railway earnings appreciably. The total revenue passengers have increased 22 per cent since the installation of the pass, the transfers have decreased 41 per cent, and there has been less than a 2 per cent change in either the car-miles or car-hours operated. The company considers the pass to be a "winner."

The weekly pass, according to W. H. Boyce, was put into effect on the Beaver Valley System on Feb. 13, 1922. The single-zone pass was sold at 85 cents, two-zone for $1.60 and three-zone for $2, but since April 10 the three-zone pass has had no distance limit. This was done because it was found that 94 per cent of the revenue was derived from one, two and three-zone riders. The highest week's sale has been $1,359.95. In practice the actual number of rides per pass is four per day. The pass also stimulates other riding. Seventy per cent of the money received from the sale of passes is an increase in revenue.

The company also has special rates, such as books of 100 tickets for $4.50, and at least once a month and sometimes oftener round trip excursion tickets for one fare to persons attending Dollar Day or Suburban Shopping Day in Beaver Falls or Rochester, which are the largest towns. Just now a ten-day sale of six tickets for 25 cents is being considered to help meet the bond interest.

Proper credit for the receipts from sale of passes is given each day's business by splitting the amount of the weekly sale, allowing 15 per cent for week days and 10 per cent for Sunday. The method of registering pass riders is that on Tuesdays, Saturdays and Sundays the trainmen make a check on all passes presented for transportation. No abuses of the pass privilege have been noticed. Owing to the use of zone fares, the passenger must present the pass to the operator both upon entering and leaving the car; to prevent over-riding the cash or ticket rider gives up his destination fare receipt upon exit. The advertising bill for putting the pass into effect was about $300.

Walter Jackson, Mount Vernon, N. Y., said that in cases where there had been no fare troubles or jitney competition the railway companies could well make use of the pass to offset the private automobile. He urged the use of the weekly pass to eliminate the irritation caused by requiring cash fares, waiting in line for change, the issuance of transfers and the sense of expense for the individual ride.

G. T. Seely called attention to that part of the report of the committee which gives statistics as to the weekly pass in Youngstown.

J. A. Dewhurst. Oil City, Pa., stated that his company was planning to adopt the pass on one of its properties, but that the Interstate Commerce Commission had raised a question as to its legality in interstate commerce. The arguments used were that all steam road transportation is based on the sale of the tickets at a definite price for a definite service, and that if the service is not rendered the purchase price may have to be refunded on demand.

D. W. Pontius, Los Angeles, said that the California Railroad Commission had raised the same question, but had finally allowed the pass to be put into effect.

Tuesday Session

The Tuesday afternoon session of the Transportation & Traffic Association opened with a short safety talk by R. M. Reade, Quebec, P. Q. He said that thought is the basis of safety. In other words, lack of thought causes accidents.

Next, on motion of the committee on nominations, Samuel Riddle, chairman, the following were elected to the positions named: President, G. T. Seely, Youngstown, Ohio; first vice-president, J. K. Punderford, New Haven, Conn.; second vice-president, Arthur Gaboury, Montreal, P. Q.; third vice-president, T. C. Cherry, Syracuse, N. Y.; secretary-treasurer, J. W. Welsh, New York City; executive committee, G. H. Clifford, Fort Worth, Tex.; J. V. Sullivan, Chicago, Ill.; Edward Dana, Boston, Mass.; W. H. Boyce, New Brighton, Pa. (replacing Mr. Cherry).

H. B. Flowers, Baltimore, Md., then read the report of the committee on traffic regulations, of which he was chairman. This report is abstracted below:

TRAFFIC REGULATIONS

During the year the committee on traffic regulations, according to its report, followed closely the activities of the International Traffic Officers' Association, which has opened national headquarters in Washington and has commenced the publication of a national organ, known as *The Traffic Officers' Journal.* It is, however, too early to express an opinion of the probable outcome of the work of this organization.

W. H. Maltbie, of the committee, represented it at the National Highway Traffic Association meeting held in New York on May 12. At this meeting the Highway Association recommended:

1. That the United States Bureau of Standards be requested to make a study of the proper coloring for signs;
2. That railway crossing warning signs which would probably apply to all rapid transit crossings, be placed at a uniform distance from the crossings;
3. That all signs be between 5 ft. and 8 ft. from the ground.

A representative of the committee likewise attended a conference on "Standardization of Colors for Traffic Signals" which was held in New York on May 23, and at which thirty-four national organizations were represented and four others indicated interest in the matter.

A. W. Whitney, chairman of the American Engineering Standards Committee, the organization which called the conference, presided. Invitations to the conference, which had been called at the request of the Illuminating Engineering Society and the International Traffic Officers' Association, were sent to all interested organizations, including automobile, highway, railway, traffic and engineering organizations. The Canadian Engineering Standards Association represented the Canadian interests.

A. H. Rudd, on behalf of the American Railway Association, presented a paper outlining the fundamental colors used by the steam railroads, and suggested lines along which that association would like to see standardization progress. While signal systems of different railroads differ in some respects the fundamentals are largely standardized. For the operation of trains these include: red for danger (stop); yellow for caution; and green for clear. The use of yellow for tail lights of automobiles and of green for fire exits was suggested as steps toward national uniformity.

On behalf of the American Electric Railway Association a report was submitted outlining the following items:

AMERICAN ASSOCIATION SUGGESTIONS

The standard colors in use for night signals in electric railway practice are: red for "stop"; yellow for "proceed with caution"; green for "proceed at schedule speed."

Blue, purple and white, it was pointed out, are also used in a restricted way, for conveying special information or for safeguards. For example, a blue signal means that car repairmen are at work, and the cars protected by such a signal must not be moved until the workmen who placed the signal have removed it. Purple may denote a fire alarm box or a telephone station, etc.

For day signals, hooded light signals using the night colors are used to some extent. Probably in the majority of cases, however, day signal indications are given by means of semaphore arms, the position of the arm denoting whether the signal is set at "stop," "proceed with caution" or "proceed at schedule speed." The shape and the color of the arm also convey information as to operating conditions, type of signal protection, etc.

There are a number of variations from the above, the newest signals of the Pennsylvania Railroad, for example, being light position signals where hooded white lights are used against a black background utilizing the semaphore principle.

Electric railway signals are operated in various ways such as by continuous track circuits, by contactors, or other end set devices, by interlocking towers, by manually operated light switches, etc. Experiments are now being made to determine the availability of the wireless telegraph and telephones for controlling and safeguarding train movements, either by signals on the right-of-way or in the motorman's cab and for operating in emergency the train air brakes.

For grade crossing highway protection, when a train is approaching, a red signal either fixed or moving, either steady or flashing, is sometimes used, frequently augmented by moving arms, siren horns or bell signals. These signals are in addition to the ordinary painted signs posted along the road in advance of the crossing.

A red signal has been used universally as indicating danger from time immemorial, and it would be unwise to take any steps to do away with this generally accepted use of red.

All moving vehicles using the highways should carry a tail light lighted during the night hours and during hours when visibility is low. In many places a red flag is required to be attached to the rear of vehicle loads where these loads project beyond the rear of the tailboard. If this is needed during the day, it is more necessary at night, and this conference should recommend that on all such loads a red light should be displayed at its extreme rear end during the night hours.

As a general plan the accepted practice of the railroads is suggested for traffic signals, viz.: Red for "stop;" yellow for "proceed with caution," and green for "proceed at allowed speed."

A suggestion has been made in the public press recently that yellow be adopted as the color for automobile tail lights. From the viewpoint of electric railway operators this is not wise. The automobile is a free and fast-moving vehicle. It can operate on any part of a highway that its driver wishes, and as an ever-present and needed warning of danger, the committee opposed the use of yellow for such a purpose.

As a matter of sane and safe practice, an automobile driver should so operate his car that by the use of his headlights he can tell when there is any danger ahead and be governed accordingly, and the argument that has been advanced that red lights are confusing and convey conflicting information is one which, in the interests of safe operation, should not be advanced.

The dangers that are present on highways and thoroughfares under modern conditions, have increased materially since the era of the self-propelled vehicle, and nothing should be done which would tend to take away any of the existing elements of safety. On the contrary, the efforts of the electric railways should be towards throwing further safeguards around the public streets and it would be a serious backward step to attempt to change to some other color than red for automobile tail lights.

The conference of May 23 recommended that there be national uniformity in the use of colors for signals, and that their unification should include the use of colored lights on all vehicles used on the highways, on signals along the highways and at curbs that are both permanent and temporary, and on signals marking highway crossings of both steam and electric railroads. It was recommended further that there also be a co-ordinated relation of color, of all street lights, form, position, number of lights, even though flashing or moving signals are used; that there be distinguishing colors for non-luminous as well as luminous signals; that recommendations be made on the use of colors for emergency exit signals and that the methods of specifying or defining colors for signal purposes be unified.

These conclusions were referred to the American Engineering Standards Committee to be carried out in accordance with its regular procedure.

The report was signed by H. B. Flowers, chairman; T. C. Cherry, sponsor; H. O. Butler, F. R. Cogswell, F. P. Edinger, W. H. Maltbie, Fielder Sanders and Paul E. Wilson.

Mr. Flowers was followed by Lieutenant John Martin of the Chicago Police Department.

TRAFFIC OFFICER SELECTION AND TRAINING

Lieutenant Martin explained how patrolmen are selected and trained for traffic regulation in Chicago. Looking back twenty-five years or so, he said that in the early days the older patrolmen were selected for traffic work in the Loop district, their function being merely to help pedestrians get across the streets.

The advent of the automobile changed conditions. The work of the men became that of traffic regulation, the older men being retained. The result was traffic congestion, and the need for more speed became imperative. To this end, men of a different type were needed. The idea had first to be sold to the chief of police; it was hard to convince them of the need for picked men for this work. Chief Fitzmorris is one who fully appreciates the importance of this matter.

In Chicago recruits for the police force receive sixty days of schooling in general police work. A few days before the end of the period, the traffic department is given an opportunity to examine the men in groups, to select suitable ones for its work. In this selection, temperament is an important factor.

The men selected for traffic work go to a traffic school. This brings out their traffic ability, if they have any. After they have been assigned to posts their work is carefully supervised, the sergeant or lieutenant studying the men in action. Only three or four men out of ten trained in the traffic school prove satisfactory.

Experience in Chicago shows that to secure speed, promote safety, etc., the men must be drilled in every detail. Two or more weeks, for example, are needed to drill them on hand signals alone. Uniformity in signaling is absolutely essential. Tests on men who have never had experience on a beat, in Chicago, showed fine results from the schooling given them. They permitted no blockades, which were frequent with inefficient men.

Referring to the matter of parking, Lieutenant Martin said that 50 per cent of the troubles of the traffic officer are due to this. In the Chicago Loop district, 2,800 automobiles only could be parked if all of the curb space were filled. This would involve four lines of traffic and all moving traffic would be forced upon the car tracks. This would be an impossible condition. When one realizes that there are upward of 200,000 automobiles licensed in the Chicago district he will see the great possibilities of congestion in the Loop district, for a considerable portion of these enter this district daily. The question is why a small number of automobiles should be allowed to park in the Loop to the inconvenience of a much larger number. The prohibition of parking would greatly simplify the traffic problem, but it is difficult to bring about. Merchants seem to have the idea that their business would be interfered with in this case. The fact is that an unobstructed front before a store is beneficial to business. In Chicago parking is prohibited in the Loop district between 7 and 10 a.m. and 4 and 7 p.m., but this is not enough.

Electric railway men who operate properties in cities should oppose the time limit in parking; vehicles should simply be permitted to load or unload passengers or merchandise. Cities will have to come to some such regulation if the traffic problem is to be solved. Any ordinance permitting any parking time is an inducement to automobile owners to come into the congested district to park their machines. When they do not find any parking space they cruise around seeking space, and in so doing greatly increase the congestion.

In further discussion of traffic regulation, R. F. Kelker, Jr., city supervisor of transportation, Chicago, said that all large cities need to study traffic, not in generalities but in actualities. Many cities fail to have any conception of the number of people, automobiles and trolley cars that use the crossings, or even the speed with which they pass a given point. In Chicago there is a bureau to keep track of traffic and to get the facts as they exist so as to determine the amount of traffic that has to be handled at any of the important traffic points. At present there are plenty of traffic laws and ordinances, but they are not self-enforcing. What is really needed every time a new traffic ordinance is possible is to have additional policemen for its enforcement.

Mention was also made of the automatic signal. Mr. Kelker said Chicago is suffering from "signalitis trouble," and that all persons who have types of traffic signals are urging the city to buy them, holding that each will solve the traffic problem. Very few signals of this type are satisfactory. In fact, not many would be needed to handle the regular traffic if the uneducated and untrained drivers who get out only on Saturdays and Sundays could be eliminated. The regular daily driver is easily handled, for he usually follows the signals properly. Uniformity of signals is also essential, both as to signs, lights and enforcement, and every endeavor should be made to get rid of the fellow who refuses to "play the game."

G. B. Anderson, Los Angeles, was the next speaker. He said that the automatic signals, such as are used in Los Angeles, controlled from a central point, for certain fixed and predetermined time limits irrespective of the traffic, are not satisfactory as oftentimes cars are unnecessarily delayed while waiting for signals when there is no traffic passing.

The next feature of the program was the report on safety work, presented in abstract by W. H. Boyce, chairman. The report presented was in substance as follows:

SAFETY WORK

The committee had the problem of convincing those charged with providing budgets that executive disregard of the waste of preventable accidents is mismanagement, accidents can be prevented and accident costs reduced by organized effort, and organized effort means practical common sense and systematic plans.

Any electric railway official may believe that he has an efficient organization, but to sell him the idea of organized safety he must first be convinced that it is a necessity in his business, and that it is not a duty that he may delegate to some already overburdened department head to take up at his leisure. Through organized safety work we bring about safe working conditions, safe practices and safe operation, all of which make for a safe and efficient workman, a man with confidence in his employer and himself, a man who is working for the best interests of his employer because he knows that his employer is interested in his personal safety and that of his fellow workmen.

It is not efficient operation nor good management when the debit side of the ledger shows a large percentage paid out in settlements and compensation for personal injuries and damage cases among the employees and the patrons of the road.

The lack of organized safety work among the electric railway companies in the country, as developed by questionnaires, conclusively shows that the committee must direct its effort toward securing the active co-operation of the managements of all of the railways in the institution of organized safety work and that this work, once instituted, must be carried on continuously.

Since February, through the excellent co-operation of the technical press, the committee has been able to have published one or more accident prevention articles each month as well as a safety number of *Electric Railway Journal*, *Aera* and *Electric Traction*. The committee has been responsible for a display at the mid-winter meeting and at this convention of various kinds of accident prevention signs, newspaper advertising copy, car cards, dash signs, pamphlets and slogans. Circular letters and pamphlets have also been distributed. The committee has also offered advice on safety work in answer to a notice that it was willing to do so, published in the technical press.

The committee recommends and will support the National Safety Council, but out of 943 electric railways in the country only 110 are members of the council.

To be successful, safety work must be continuous and organized; haphazard, spasmodic efforts will not only fail to bring results but will discourage the management and the employee.

Properly planned, well-organized safety work carried on as a continuous program, with the executives of the company behind it, and under the direct charge of an individual who has a thorough understanding of the work, cannot fail to bring results. Every company that has tried organized safety work has succeeded, and the managements realize the tremendous waste of money and human life that had been going on with their passive consent and open negligence during the years previous.

The committtee recommends that a program of organized safety be adopted by each member company of the association; that a joint committee be appointed consisting of members of the Transportation & Traffic Association, the Claims Association, the Advertising Section and the National Safety Council being prepared at all times to give advice, furnish progressive safety bulletin board, company publications, newspapers and car card material and to aid companies in other ways in the formation of and in the carrying on of accident prevention work.

The report was accompanied by approving comments on organized safety work by prominent electric railway executives and others, a recommended plan for organization of a safety committee for various sized properties, sample newspaper ad. copy slogans, sample bulletins, car cards, and other like material, as well as by a bibliography of safety and accident prevention on electric railways.

The report carried a feature cover and was signed by W. H. Boyce, chairman; J. R. Blackhall, F. H. Hill, D. E. Parsons, E. D. Reed, C. B. Scott and C. L. Van Auken.

Methods of organization and the conditions which made it necessary for the committee on safety work to spend time in pursuading some of the member companies that such work is a necessary part of electric railway operation took the principal attention in the discussion of the committee report. Britton I. Budd, Chicago, said that it seemed as if the committee was endeavoring to advance reasons why safety work should be entered into. This he characterized as almost absurd and said that such work is an essential and vital part of railway operation. He declared that he would not operate a railway which did not include such work as a fundamental part of its operations, and took to task the men who could not see this necessity, when every industry is already giving the question serious and extensive consideration. Every company should employ such means as conditions will permit and the committee, he said, should devote its time to a comparison and study of the methods which have proved successful rather than to dawdle along wheedling members into safety work.

J. P. Barnes outlined the organization used on the property in Louisville of which he is president. This includes a general committee and division organization in which autonomy in the selection of members of the various committees is practiced. This feature he characterized as giving the best results. Men are kept on committees long enough to gain a comprehensive view of the meaning and importance of safety work, but efforts are made to get as many men as possible into active safety work. Men who have served are given a distinctive badge. Inspections of one department by another from a safety standpoint are made and, in addition to the safety features, social features are introduced. This interchange of department work results in broadening the vision of all employees and in better work. In the safety contest work the carhouse having the highest record in any one month is given a dinner the following month.

Mr. Barnes said that the twelve months' cost of these dinners, including supplementary dinners and the provision of the dining hall, had been $12,000 and the reduction in accident expense as a result of the contents totaled $150,000. In the last twelve-month period the number of fatal accidents had been nine, as against twenty in the preceding twelve months. The speaker said that men are entitled to know what becomes of the suggestions they make and operating officials or executives cannot afford to fail to acknowledge any suggestions made. If they cannot be used an explanation should be made to the employee giving the reasons. Many times, he said, the effort to write an explanation results in clarification of the executive's own ideas.

If every railroad would take up safety work and carry it out properly, H. J. Bell, secretary of the Chicago Safety Council, said, the results would be measured in the same terms as an increase in fares or a reduction of taxes. In the experience of the railroad administration during the war, the roads which secured the greatest results were those whose executives gave the greatest co-operation and whose personal attitude toward such work was right. Nothing will do so much in the improvement of relations between employer, employee and public as a real program of accident prevention, was Mr. Bell's opinion. He outlined the organization and work of the Chicago Safety Council. In the discussion a question was raised as to the advisability of using an accident bogey and particularly as to the experience with no-report accidents in this connection, Mr. Barnes said that at Louisville the discovery of a no-report accident throws out the carhouse involved for that month. The result of the contests has been a falling off of the no-report accidents and an increase in the accidents reported. The same experience was related by R. M. Reade, Quebec, P. Q.

The last item on the program was the reading, by H. H. Norris in the absence of the writer, of a communication from C. M. Talbert, president St. Louis (Mo.) Safety Council and member National Safety Council executive committee. Mr. Talbert commended the report for its direct entrance into the subject and for getting at once to the problem from the operating companies' standpoint, as well as for its emphasis upon the necessity for organized continuous safety work. He said that any appreciable reduction of accidents over a period of time is the result of a well-thought-out program, based on well-established principles.

After emphasizing and reinforcing several of the points made by the committee, Mr. Talbert said that his experience has shown the general public to be wary of every effort, even for its own good or safety, that may be made by one who may possibly have an ulterior or selfish motive. To be reached effectively, the public must be appealed to through some general community endeavor in which all may take part. The efforts of an electric railway to secure public co-operation should be along the line of forming a general public safety committee, in which the company will be one unit of twenty or more.

Mr. Talbert closed by expressing the hope that the relations between the Railway Association and the National Safety Council may be closer, and that the council, through its headquarters or its locals or both, may be of distinct help in working out the problem of reducing accidents on electric street railways.

Wednesday Session

The first thing on the program of the Wednesday afternoon session was the presentation, by C. E. Morgan, chairman, of the report of the committee on one-man car operation. An abstract of this report follows:

ONE-MAN CAR OPERATION

The committee on one-man car operation reported a marked increase in the operation of one-man cars compared with the 400 cars of this type in service Dec. 31, 1916. Today over 7,000 cars are being operated by one man, approximately 30 per cent being of the double-truck type, most of them originally designed for and operated as two-man cars, but converted to permit operation by one man. Further use of the one-man operation is being applied to the off-peak hours of travel on lines of heavy traffic by the use of large double-truck cars equipped for one-man-two-man operation, the second man or conductor working only during the peak loads.

Many novel features in car design are being used in the further development and application of one-man operation, such as the use of wider aisles, double passageways and with entrances and exits controlled by turnstiles and doors.

With a view to securing the proper car design, this committee, in co-operation with the committee on unification of car design of the Engineering Association, adopted the following resolution:

> The present car of the single-truck, lightweight, one-man type has its economical limitations. In semi-congested districts there is a demand for a car somewhat larger than the present smaller car and with either single or double passageways. There is likewise a demand for a car of still larger capacity for one-man or two-man operation as traffic conditions require. Your committee believes that in the design of such cars it is desirable to provide liberal widths of aisle and passageways so as to facilitate the movement of passengers in interchange and toward the rear of the car.

As the wide adoption of the one-man operation made a revision of the standard code of city operating rules necessary, the committee prepared and submitted for adoption certain amendments to the standard code of city operating rules adopted at the 1909 convention, and amended in 1910, 1911, 1912, 1913 and 1914 conventions.

This report was signed by C. E. Morgan, chairman; J. V. Sullivan, sponsor; F. G. Buffe, S. W. Greenland, R. B. Hull, C. W. Kellogg, Dudley Montgomery and D. A. Scanlon.

The presentation of the report was followed by the reading of a paper on "The Light-Weight Interurban Car," by J. P. Pope, general manager Kentucky Traction & Terminal Company, Lexington. A paper on "The Turnstile Car Used on the New York State Railways," by J. E. Duffy, superintendent, and H. S. Sweet, engineer of equipment, New York State Railways, Syracuse, was read by Mr. Duffy. Both of these papers are abstracted elsewhere.

Mr. Duffy, in closing the paper, said that the New York Public Service Commission had just approved the turnstile cars for operation by his company. He said that the chief engineer of the commission had stated that this type of car is as safe as any operated in the state of New York. In Rochester operation has just been commenced with this type of car on several routes.

TURNSTILE CAR ON THIRD AVENUE RAILWAY

The discussion of the paper by Messrs. Duffy and Sweet was opened with a written contribution by W. E. Thompson, superintendent of transportation Third Avenue Railway System, New York City, and J. S. McWhirter, superintendent of equipment of the same company. They said, in part:

After several years of satisfactory operation of single-truck one-man cars and the development of the foot-control one-man car, we began the use of double-truck cars with one man. In the operation of double-truck one-man cars, the most serious criticism has been the congestion which occurs near the forward end of the car when the passenger-loading materially exceeds the seating capacity. We were, therefore, much interested in the idea of the turnstile car as developed in Syracuse to overcome this condition.

Before seeing the Syracuse car in operation, we questioned whether it was practicable for one man to control both front and rear doors without increasing step accidents. Our observation of the Syracuse car in service convinced us that this could be done with safety, and this phase of turnstile operation has been borne out by our experience while experimenting further with the turnstile car.

We constructed a "pay-as-you-leave" experimental car somewhat along the lines of the Syracuse car, loading the passengers at the rear end through a turnstile. The car was equipped with our standard interlocking door and step control, which prevented its being started until all doors were closed. We also used an emergency brake equipment, combining all the functions of the safety car equipment. The car was operated with our standard pedal-control. We used the same rear vision mirror idea as is used in Syracuse. The design, equipment and control of this car was fully described in the *Electric Railway Journal* of Aug. 19, 1922.

With the hope of unloading passengers as rapidly as the use of the turnstile had made it possible to load them, we conceived the idea of using a double-stream front exit; one stream through an automatic coin-operated turnstile and the other by a standard fare box where the operator could make change and issue transfers. With this arrangement, the passenger who had his exact fare ready could use it to unlock the automatic turnstile so that he could pass through it and alight from the car without being obstructed by passengers desiring change or securing transfers.

Single-end cars lend themselves much more readily to the adoption of turnstiles than do double-end cars, but as all cars used on the Third Avenue System are double-end, our scheme involved the use of four turnstiles per car, thus making it necessary that they be very compact. For this purpose we availed ourselves of the folding-arm turnstile which has been used on the stations of the New York, Westchester & Boston Railway for some years.

The results attained with the rear-entrance, front-exit car were fully up to our expectations in distributing the passenger load through the car. We were able to decrease the time consumed in boarding and alighting per stop per passenger as compared with the Syracuse car about 30 per cent. But our time per stop per passenger was still 30 per cent higher than we obtained with our standard double-truck two-man car and 20 per cent higher than are obtained with our standard double-truck, double-stream-door one-man car.

We are convinced that when the novelty of the turnstile arrangement has worn off and the traveling public has become accustomed to the use of turnstiles on surface cars, boarding and alighting time on that type of car will be decreased. It may be that when the traveling public has realized the advantage of the fullest use of the automatic turnstile, with the double-stream exit, the rapidity with which passengers can be handled on turnstile cars will be determined by the speed of the single-stream entrance. We also believe that in analyzing the time element per stop per passenger careful consideration should be given to the time consumed in the door movement as well as the passenger movement.

Our experiment has shown that because of the through circulation of passengers on the turnstile car, passengers in excess of the seating capacity can be handled with greater freedom of movement and less inconvenience to the passenger than can be done against the counter current in our double-truck, double-stream-door one-man car.

To provide a double-stream, front-exit on a rear-entrance turnstile car, a turnstile must be used at each end. It follows, of course, that on a double-end car two turnstiles must be installed on each end, and the space necessary for the installation of the turnstiles and proper guide rails, or chains, can only be provided for by sacrificing seating capacity. With us, this loss of seating capacity amounted to about 25 per cent of the seating capactiy available on the same unit if this unit were arranged for double-stream-door front-entrance operation, without turnstiles. But the double-stream, front-entrance-door car, although it permits of greater seating capacity, does not provide the free circulation of passengers obtainable with the rear entrance turnstile car.

The essential data of the operation of our turnstile car are as follows:

Scheduled speed of line, m.p.h.	8
Actual speed of turnstile car, m.p.h.	7.4
Stops per mile	10.6
Average passengers per car-mile	28.3
Average duration of stop, seconds	12.02
Average time per stop per passenger, seconds	2.45

For our standard cars in similar service the average duration of stop per passengers is as follows:

Two-man, rear-entrance-and-exit, double-stream-door, with front-exit single-stream-door, seconds	1.85
One-man, front-entrance-and-exit, double-stream-door, seconds	2
One-man, front-entrance-and-exit, single-stream-door, seconds	2.50

We have tried to lay the result of our experiment before you as clearly as possible without having advanced a definite conclusion, as in our opinion the turnstile car is still in its experimental stage.

James F. Hamilton, president New York State Railways, told how at first he was not much of an enthusiast for the turnstile car but now he is convinced that it is the solution for the successful operation of the one-man car and he was confident that this type of car is here to stay. Operation would have been started earlier, in Rochester, if the company had had the money and the time. Plans now are to extend operation of the turnstile car to practically every line in that city and also on a 40-mile interurban line. He believed that the one-man type of car is the salvation of the railway industry.

H. H. Adams, Chicago, recalled his statement made at Atlantic City some years ago concerning the necessity of having a double passageway on one-man cars instead of the single combined entrance and exit as was first developed. He told how in Chicago he had developed a double-passageway one-man car to permit loading and unloading to be done under the eye of the operator. The exit in this type of car is protected by an automatic door which is opened by the passage of the passenger who steps on a treadle, and it does not close until the passenger has left the car step.

In the development of this car he had looked very carefully into the question of turnstiles, but his study of the problem showed that any barrier in the passageway only tended to slow up operation. It is essential that free movement of passengers be maintained and turnstiles, no matter of what kind, all tend to slow up operation. One car equipped with this type of automatic exit door has been in operation since last March over a line that is not in the congested part of the city. A speed of 14½ m.p.h. with six stops per mile is maintained. One of the biggest problems in connection with the operation of the automatic exit door was to have it operated by a small child.

G. H. Clifford, Fort Worth, Tex., said that the light-weight one-man car had made more frequent headway possible and that one of the fundamental ideas of using it was to improve service. He believed in giving the people the best service possible and then attempting to get them to pay a fair rate of fare. The cost of rebuilding cars for one-man operation, including the equipment, is often hardly justified.

H. H. Brown, Duluth, told how for the last two years one line had been equipped with eight turnstile cars and how by means of a railing that extended into the rear part of the body he had succeeded in eliminating congestion on the rear platform. Turnstile cars, he maintained, do not slow up the line.

At first there was some aversion on the part of the passenger to the railing installed, but none to the registering turnstile which was used to count the ticket fares collected. He believed that the turnstile type of car would not be successful unless it had a front exit.

E. A. Roberts, New York Transit Commission, said that all economies must be practiced in New York on account of the 5-cent fare in effect in that city and that the turnstile cars in operation there by two companies had not been in service long enough to draw any definite conclusion. The attitude of the commission toward such development was all encouragement.

John F. Ohmer told how ten years ago the first installation of turnstiles was made on twenty-one cars of the double-end type for operation over the Riverdale line of the People's Railway Company in Dayton. These turnstiles were successfully operated even though there were six different classes of fares that had to be registered. The equipment was in operation for three summer months and the company was delighted because the receipts were materially increased and the passengers registered their own fares. The conductors capitalized the complaints and put the matter before the city commission, which, after hearing, sustained the company in its use of the turnstile. The conductors, however, appealed the case to the State Public Service Commission and after a hearing the commission ruled that all turnstiles on cars should be removed and further refused to allow this type of equipment on any car operated in the State of Ohio.

Thursday Afternoon Session

The closing session of the Transportation & Traffic Association meeting was opened with the report of the committee on personnel and training of transportation department employees, which was read in abstract by the chairman, J. E. Wayne. An abstract of this report follows:

PERSONNEL AND TRAINING OF TRANSPORTATION DEPARTMENT EMPLOYEES

The committee devoted its attention during the year to the following topics: (1) Psychological tests for motormen and conductors, (2) training of one-man car operators, (3) standard form of application for employment as trainman and (4) standard form for physical examination. The committee had hoped to be able to retain the services of an expert on applied psychology, but funds were unavailable for the purpose.

The idea in taking up the subject of psychological tests was that some kind of mental examination might well accompany the physical examination as one factor in selecting trainmen. A number of railway properties, at home and abroad, are already using such tests on a smaller or larger scale. Some companies have used mechanical apparatus to test qualities of the mind and nervous system, but this phase of the subject required more investigation than was practicable this year. The aim of this year's committee was to outline such simple procedure as could be applied without great expense on any electric railway property, and without greatly modifying the present employment organization.

The committee first considered the mental qualities required for trainmen and agreed that they should be courteous, intelligent and mentally alert; that they should have good memories and the mental qualities of attention, concentration and perception. They should have good judgment of speed and distance, the power of prompt motor reaction in emergency and the faculty of perception in reference to possible danger at railroad crossings. Further, that motormen should show intelligence in starting and stopping an electrically propelled vehicle and in careful operation on dark streets or in dense fog. While these qualifications could be partly determined by a conversation with the applicant, it is advisable to explain to the applicant the requirements expected of employees as well as to indicate certain policies which are relied upon to furnish the best possible service to the public.

In Appendix "A" extended lists of suggested questions are given. These questions were prepared by Dr. John Leeming, who has used many of them in connection with his duties as chief medical counsel of the Chicago Surface Lines. Dr. J. A. Rowland, educational director of the Milwaukee Electric Railway & Light Company, prepared the outline of the whole subject of mental tests given as "Appendix B." The committee suggests that member companies apply as much of this material as is practicable, accumulating data which can be used by later committees in recommending the most desired standard form of procedure. It also strongly urges that some form of mental test, however simple, be used by every company.

As to the training of operators for one-man cars, the committee finds the opinion general that a combination of the training usually given to motormen and conductors is necessary. This requires but little more time than is needed for training either a motorman or conductor. The committee feels, however, due to the higher degree of responsibility imposed on one-man car operators, men of the better grade should be employed in this work, and the use of intelligence tests assumes even more importance than under two-man operation.

A form of application for employment as trainman and another for use in connection with physical examination were recommended by the committee for adoption as a "recommended form." The committee consisted of J. E. Wayne, chairman; F. L. Butler, Edward M. Graham, Dr. John Leeming, A. P. Norris, H. H. Norris and Dr. Arthur J. Rowland.

The appendices to this report were unusually extended and interesting. In the abstracts given of Appendices A and B some of the questions and comments have been omitted:

APPENDIX "A"—SUGGESTED QUESTIONS FOR USE BY EMPLOYMENT OFFICERS

Examiner to Use Only Such Questions as He Deems Necessary to Bring Out the Information from the Applicant

TESTS FOR CONDUCTORS

(To indicate general intelligence and judgment)

Have you a good memory?

Repeat the days of the week backward beginning with Saturday.

Repeat the months of the year backward starting with July.

Count backward from 19 to 10. Count backward from 30 to 20, skipping every second figure—as 8-6-4-2—beginning with 30.

Pay close attention to the five figures that I mention and repeat them backward. The figures are 3-1-8-7-9.

Do you know the meaning of the words: 1. Courtesy? 2. Civility? 3. Efficiency? 4. Politeness?

What is your idea of the value of such qualities in a conductor?

A man's salary is $20 per week—he spends $14 each week—how long would it take him to save $60, $18 or $48?

Our street car fare is —— cents. A man pays for three and gives you 50 cents—what change would you give him?

Our half-fare is —— cents. A passenger pays 1½ fares and gives you a one dollar bill, how much change would you give him?

What is your idea of the distance between the rails of a street car track?

From your observation of our cars, what is your judgment as to the seating capacity of one of the large pay-as-you-enter (or other) cars?

It is now (state time).

What time would it be if the hands of the clock were reversed?

A rifle carries perfectly for 100 yards. Is it any harder to hit a 12-in. plate at 100 yards than at 50 yards?

If a car travels a mile in five minutes, how far would it travel in half an hour? In one hour? In one and one-half hours?

Suppose there are eight blocks to a mile and a car travels at the rate of 10 miles per hour. How many minutes would it take to travel four blocks? How long would it take it to go one mile?

I see by your application that you are applying for the position of conductor. Do you understand that in that position you will be expected to help the company sell its street car service to its patrons? How do you think you can help to accomplish this purpose?

TESTS FOR MOTORMEN

(To indicate quickness of motor reaction to special sense perception, especially sight and hearing.)

How many panes of glass are there in that window?

How many fingers am I holding up?

Observe carefully the movements I make with my hands and arms and repeat the same movements.

When you hear me say square, draw a square on this paper.

When you hear me say circle, draw a circle around the square.

When I say triangle, make a triangle inside the square.

Execute quickly the following orders as soon as you receive them: Stand up, walk forward six steps, hop three times on left foot, march, halt, sit down.

To Indicate Judgment of Speed

At a good brisk gait, how many miles an hour does a man walk?

How many miles per hour does a horse go at an ordinary trot?

What would you consider fast speed in miles per hour for an automobile on a boulevard?

Are you able to estimate with reasonable accurateness when an automobile is going 25 miles per hour?

How do you make such estimate?

How fast do you think street cars run going at full speed?

To Indicate Judgment of Distance

What is the length of an ordinary city block?

How long are the large pay-as-you-enter (or other) cars?

What is the distance between the rails of a street car track?

What is the width of ——— street from curb to curb?

Suppose a wagon is driving on the track 100 ft. ahead of you at 8 m.p.h. and your car is going 16 m.p.h. about how many feet will you travel before overtaking it?

What is your estimate of the length, width and height of this room?

To Indicate General Intelligence and Judgment

Can you think of any sudden emergencies that might arise if you were running a street car?

What would you do if a child ran from the sidewalk in front of you car?

If you owned a street car and were looking for a man to run it, what qualities would you look for in such a man in the light of these possible emergencies?

Do you understand the meaning of the term "right-of-way"?

Under what circumstances would there be danger of striking a vehicle ahead on the tracks?

How would you avoid collisions at steam railroad crossings?

Would you take it for granted that a driver or pedestrian ahead of you and near your track would hear your gong?

Why is perfect vision in a motorman essential?

How much care can you count upon from a child six, eight or ten years old in avoiding being run over?

What is your idea of the cost of one of our cars?

Have you ever seen sand sprinkled on the track?

What is your idea of its purpose and use?

APPENDIX "B"—REPORT ON SELECTION TESTS

Prepared for the Committee by
Dr. A. J. Rowland

If satisfactory selection of motormen and conductors is to be made it is necessary first to have a specification of what sort of men we want. There is found later in this appendix a proposed form of specification for these two jobs. Everything in the employment procedure and selection hinges on this fundamental matter. With a satisfactory specification on hand we are in a position to establish tests which will determine whether applicants are really possessed of the necessary qualifications. Once these tests have been developed they can be applied with confidence and positive decisions be made. The requirements of a good trainman, exclusive of those cared for by the employment agent and medical officer, are:

Motorman

Must be steady and dependable.
Is not easily excited.
Is able to give concentrated attention.
Is able to make quick and proper responses especially in emergencies.
Has a good memory for instructions, places, etc.
Has good judgment.
Is loyal.
Will not take a chance.
Takes a pride in his work and skill.
Has reasonable self-confidence.
Has fair initiative.

Conductor

Must be honest.
Is alert and dependable.
Is friendly.
Is able to quickly grasp a situation.
Has good memory for instructions, places, names, faces.
Has good judgment.
Is loyal.
Is able to handle calculations quickly and correctly.
Has fair handwriting.
Has good voice qualities.

It is desirable to have procedure established such that all the work of selection is done in a systematic way and with as little waste of time as passible. Here is a suggested plan.

In filling the specification the employment agent manages the first elimination. He engages the applicant in friendly conversation and gives him a brief "sizing up." If he decides he is a candidate likely to meet the requirements he uses the job specification to show the applicant what the job is like. If the applicant believes he cannot meet these requirements he is likely to withdraw. If the man (with a knowledge of requirements) wants the job, the real selection begins. Measurement of height and weight and preliminary tests for eyesight, color vision and hearing are made and put down on Form 4. When the man has gone, the remaining data on that form are written in.

The applicant is next sent to the medical officer for examination according to a regular time schedule and after passing this examination he is sent to the person who gives the tests for mental qualities, mentioned later. The applicant then fills the regular application form and inquiries are sent out to references (Form 5). If these are satisfactory, the applicant is put on the waiting list.

FORM 1—JOB SPECIFICATION FOR MOTORMAN

Preferred Age — between — and — years. Must not be over — years if man has had no previous railway experience.

Preferred Nationality — American born. Ancestry such that he will understand and get along nicely with a majority of riders.

Educational: Fifth grade or the equivalent. Must read freely and write legibly.

Physical: Eyesight—Must not be nearsighted; must not be color blind.

Hearing—Must be at least 80 per cent. of normal in each ear.

Voice—Must be able to speak English plainly.

Body—Must have full and free use of arms, hands and shoulders at all times; must be able without fatigue to stand and sit, about half time each, through a period of — hours; must have no hernia, or functional or organic disease which would bar the applicant from securing life insurance.

Height—Not under — ft. — in.; not over — ft.

Weight—To conform to the standard weight chart with a maximum variation of 20 per cent. Underweight rather than overweight preferred.

Trade Experience: None required. A man formerly in street railway service who can show that he did not lose his job as the result of incompetence or poor ability is desired. A man who has some other skilled trade is usually undesirable.

Personal Characteristics: An applicant must be neat and of pleasing appearance; must be courteous, agreeable and even tempered; must be clean in his work and habits; must be honest, accurate, careful and known to be reliable and dependable. Men addicted to the tobacco-chewing habit are undesirable.

General: A married man is preferred to a single man. A man who knows the city is preferred to one who does not.

General Duties: Operating cars in the city system according to schedules and assignments as they may be given. Motormen report directly to division superintendents, but on the road take instructions from supervisors.

Conditions of Work: Clean, permanent; standing and sitting, about half-time each; Hours (filled according to company); pay, (according to company practice).

Advantages and Disadvantages: See supplementary sheet.

Expectations: Regular promotion in pay each year; an established seniority, etc.

Training: Ten to fourteen days of training required before regular work on the cars is begun. Rate of pay in this period ————.

FORM 2—JOB SPECIFICATION FOR CONDUCTOR

Preferred Age—Same as motorman.

Preferred Nationality—Same as motorman.

Educational: Same as motorman; must be able to add, subtract, multiply and divide ordinary numbers.

Physical: Eyesight and hearing—Same as motorman.

Voice—Must have a voice of pleasant quality, strong enough to reach a car length without special effort. Must speak plain English without foreign accent and enunciate clearly.

Body—Must have free use of arms and fingers at all times to handle fares, changers, and bell and register cords expertly. Must be able without fatigue to stand through a period of — hours and have free use of legs to run ahead and signal, etc. Must have no hernia, or functional or organic disease which would bar the applicant from life insurance.

Height—Not under — ft. — in.; not over — ft.

Weight—Same as motorman.

Trade Experience: Same as motorman.

Personal Characteristics: Same as motorman and in addition must grasp situations quickly and be able to make a correct statement of any unusual occurrence.

General: Same as motorman.

General Duties: Managing passenger traffic on city cars. Taking fares, making change, issuing transfers, announcing streets and points of interest, attending to the convenience and comfort of passengers, giving desired information, cooperating with the motorman in maintaining schedules. Conductors report directly to division superintendents but on the road take instructions from supervisors.

Conditions of Work: Clean, permanent; standing nearly all the time. Out of the car for switching and signalling work at crossings; hours and pay, (according to company practice).

Advantages and Disadvantages: See supplementary sheet.

Expectations and Training: Same as motorman.

FORM 3—JOB SPECIFICATIONS FOR MOTORMEN AND CONDUCTORS

The following is to be carefully explained by the employment agent. That man is always preferred who wants the job without too much consideration of its advantages. Put the disadvantages first.

Disadvantages:

1. A motorman or conductor works day or night 365 days in the year. He works Saturdays, Sundays and all holidays. When others are enjoying themselves he is at work.

2. He gets up early in the morning—before 4:30, so that he can report at 5 a.m., and he does this in every kind of weather. The worse the weather the more he is needed.

3. He stands before the public as a sort of public servant, and as such is always subject to a certain amount of abuse.

4. When he takes the job he must go to training for two weeks, during which time he is paid $— a day. He must put up $— deposit as security for the return of company property. He must invest in a uniform which will cost him about — dollars.

5. Conductors must also procure a bond for which they pay — dollars per year.

6. After training a man is put on the extra list. He is assigned to work in his turn in an endless chain. His hours are very irregular. He cannot expect to get home to meals. Dinner may come at 10 a.m. or 2 p.m.

Advantages:

1. A motorman or conductor has a steady job, 365 days a year. No matter what business conditions are, what panics come along, he is sure of his job and of his pay check. He can well compare his income with the man who gets $10 a day and only works in good weather.

2. He is earning when others are spending and is likely to become thrifty.

3. He has an open-air job and clean work.

4. He is sightseeing all day long.

5. His uniform gives him the cheapest clothing he can wear.

6. He can gain promotion if he is worthy. A large per cent. of all company executives and nearly all in the transportation department have been promoted to their present positions.

7. When in uniform he has free transportation and is given unlimited pass for his personal use when not in uniform.

FORM 4. DATA SHEET—APPLICANT FOR POSITION OF MOTORMAN OR CONDUCTOR

To be filled by employment agent.
Person who filled this sign here..........
Date filled......................
Name of applicant..........His home address..........
His probable age.....Age he gives.....
Give any physical defects you note.
Give height and weight from your own measurements.
Height ft. in. Weight lbs.
Has this man the appearance of good character and habits?

Did he meet your eyes in answering oral questions?

Is he reasonably quick in answering questions you asked?

Are his clothes carefully selected and neatly kept, and his shoes polished?

Does he show reasonable care in the preparation of his toilet; hair brushed, nails clean, face shaved, etc.

After each heading below check every quality or characteristic which you have observed in this man.

1. Appearance

Very attractive...
Makes good impression .....
Just ordinary....
Leaves poor impression .... ..
Stern or repelling
Neat ....
Untidy ....

2. Voice

Strong voice.....
Average strength.
Weak ....
Pleasant ....
Deep ....
Average pitch....
High ....
Harsh ....

3. Language

Good and without dialect or brogue ....
Some foreign accent ....
Poor English ...

4. Physique

Very erect.......
Erect ....
Round shouldered
Very tall........
Tall ....
Average ....
Short ....
Slender ....
Medium ....
Stout ....
Fat ....
Well proportioned
Dignified ....
Carries himself well ....

5. Complexion

Sickly ....
Pale ....
Healthy ....
Robust ....
Brawny ....
Fair ....
Medium ....
Brunette ....
Tanned or weathered .....
Color of hair....

Form 5. Data Sheet—Applicant for Position of Motorman or Conductor

To be sent to reference

This is sent to.................

Date of mailing................

Name of applicant (*employment agent fills in here.*)

His home address (*employment agent fills in here.*)

How long have you known this man?

How do you know him? (*Employer, friend, etc.*)

Are you related to the applicant?

His probable age

Name any disease or physical defect this man has.

Give approximate height and weight of this man.

Height ft. in. Weight lbs.

After each heading below check every quality or characteristic which is true for this man. If you do not feel sufficiently acquainted with him to specify in any group, write after the heading "Do not know."

NO ONE IS PERFECT OR EVEN OF HIGH STANDING IN ALL QUALITIES

1. Health

Fine health .....
Rarely sick.....
Subject to slight sickness ......
Poor health.....

2. Honesty

Absolutely square
It good as most.
Easily tempted..
Slips sometimes..
Dishonest ....
Truthful ....
Exaggerates ....

3. Personal Habits

Heavy smoker...
Uses cigarettes .
Chews tobacco....
Uses profanity...
Is smutty or vulgar ....
Optimistic ......
Pessimistic .....

4. Temper

Quick tempered..
Moody ....
Irritable ....
Grouchy ....
Even tempered...
Phlegmatic .....
Good self control.

5. Habits of Work

Punctual ....
Tardy ....
Always busy.....
Steady and dependable ......
Industrious .....
Slow ....
Lazy ....
Systematic ......
Careless ....
Unreliable ....

6. Disposition

Nervous ....
Easily excited...
Calm in emergency ....
Selfish ....
Stubborn ....
Foolhardy ......
Self confident....
Self reliant......
Erratic ....
Timid ....
Quarrelsome ....
Somewhat friendly
A mixer........

7. Memory

Remembers everything ....
Remembers most things ....
Remembers fairly well ....
Memory poor....
Memory very poor
Is this true for memory of faces ——names —— places ——— instructions ———

8. Ability to Learn

Learns easily.....
Average ....
Slow ....
Dull ....
Close observer...

9. Mechanical Ability

Considerable ....
Average ....
Slight ....
None ....

10. Courtesy

Very courteous and obliging...
Courteous ......
Polite ....
Tactful ....
Crude ....
Rude and abrupt
Too polite.......

11. Loyalty

Staunch ....
Lukewarm .....
Indifferent .....
Obstinate ....
Troublemaker ...

12. Judgment

Good common sense ....
Common sense...
Fair judgment...
Poor judgment...

13. Manner

Bashful ....
Diffident ....
Easy ....
Breezy ....
Depressed ......
Grave ....
Pleasant ....
Cheerful ....

Remarks:

The above statement is true to the best of my knowledge and belief.

Signed ....
Address ....
Business ....

Date ....

Notes on forms 4 and 5

It is certain that information received from references is apt to be rather wide of the truth and some of it may be entirely worthless but if the inquiry is accompanied by a letter which asks that the same frankness be shown in sending a reply as would be desired by the recipient of the inquiry were the positions of the writer and the recipient reversed some result may be hoped for. Form 3 should be sent to former employers and to persons used as references.

Tests of Mental Qualities

The low grades of intelligence will be weeded out by almost any kind of test which is given. But special intelligence tests, as applied in the army, were given to "(a) aid in segregating mentally incompetent (b) classify men according to mental capacity (c) to assist in selecting competent men for responsible positions." The proposed tests which follow are chosen to help in selection work. It is very important that the right person manages the work. The same person should always do it and should be one who has been selected with special reference to a pleasant type of personality. He must maintain an interested manner and not yield to any temptation to put things through on a machine-like basis.

Test to Show That a Man Can Follow Instructions

With your pencil draw a line through the longest of the three words: SENT, RETURN, CASH and make a ring around the second of these numbers: 2, 3, 6, 7, 8. Then, if Independence Day comes in June, write NO in this space........; but, if not, just tell where the sun rises........ Make any letter except "A" after this comma, ...and then write NO if 2 times 5 is 9........ Now, if January is colder than July, make a cross here......; but, if not, make a cross here ...... or else a circle here...... Be sure to write TO between these two names of cities: Boston ....Buffalo. Notice these two numbers; 6, 4. If cork is lighter than water, write the larger number here...... but if cork is heavier than water, write the smaller number here...... Show by a cross when the nights are longer; in summer......, in winter...... Give the correct answer to this question: Will ice float in water?...... and repeat your answer here...... Do not give here the sum of 3 and 4, ... unless you skipped the preceding question, but write the first letter of your last name at the left end and the last letter of your first name at the right end of this black line:

Oral Test of Memory—For Names Figures, Etc.

The examiner repeats the numbers at the rate of one per second. Nothing is to be said except what follows:

Repeat the numbers I read to you in the same order I give them, starting immediately after I stop.

3-1-7-5-9	4-2-8-3-5	9-8-1-7-6

Repeat these the same way

3-7-4-8-5-9	5-2-1-7-4-6	8-3-4-9-2-5

Repeat the following number but in reverse order. Thus if I said 1-2-3 you say 3-2-1.

2-8-3	4-2-7	9-5-8
3-1-8-7-9	6-9-4-8-2	5-2-9-6-1

Test of Memory—of Observation—of Handwriting

Hand the applicant a piece of paper and pencil and place him where he can write easily. He must use a pencil since all his reports will be made in pencil. He must not be told that this test is to show his handwriting since his thought must be on other things and what is wanted is his ordinary writing. One of three pictures is handed the applicant which he is allowed to view for fifteen seconds after the following instructions are read to him.

"I am going to hand you a picture which you are to look at carefully for a limited time. Try to see everything in the picture so you can recall the scene very completely. Then as soon as I call time and take the picture away, write down on the paper I have given you everything you can remember there was in the picture and afterthan write a few sentences to tell what the story in the picture is, what it is a picture of, or what the picture is about. (The pictures suggested are the Dutch home, river scene and post office as used by Professor Terman in the Stanford revision of the Benet-Simon intelligence scale.)

Test of Judgment

Make a cross (×) on the short line before the answer which you think is best.

If your trolley car ran off the track what would you do?

——Try to run on the street.
——Call the fire department.
——Call the emergency truck.
——Try to lift the car back onto the track.

If you were a passenger and fell asleep on a train and rode past your station, what would you do?

——Pull the bell rope and stop the train instantly.
——Tell the conductor to take you back.
——Get off at the next stop and take another train back to your station.
——Jump off and walk back.

If a child started running out into the street after his ball a very short distance in front of the car what would you do?

——Notify the conductor.
——Ring the gong vigorously.
——Speed up the car.
——Make an emergency stop.

If a passenger asks you to speed up your car so that he can catch the car ahead, what would you do?

——Speed up the car so as to satisfy the passenger.
——Do nothing at all.
——Decrease the speed of the car.
——Refuse to comply with the request of the passenger.

If a passenger bawls you out when you don't deserve it what would you do?

——Call the conductor to help put him off the car.
——Shout back at him.
——Say nothing at all to the man but report the incident.
——Explain quietly to the man that he is wrong.

If you were dissatisfied with the wages being paid by this company what would you do?

——Look for another job.
——Growl about it among your friends.
——Consult your superintendent about a raise in wages.
——Urge all your fellow workers to ask for a raise.

If a man hit you without meaning to do so while you were on duty what would you do?

——Hit him back.
——Swear out a warrant for his arrest.
——Excuse the man.
——Report the matter to your superintendent.

Oral Test of Ability to do Required Calculating Work

The examiner should read each question clearly and plainly once only. The answer is then awaited for a reasonable time. If it doesn't come, go on with the next. Do not say whether an answer when given is right or wrong. Keep right on in a pleasant tone of voice to the end.

The rate of fare for an adult passenger on our lines is 7 cents (modify to suit the road) and for children it is four cents.

How much will it cost four grown people to ride?

What is it for a party of five children?

Seven children get aboard and give you a quarter. What will the change be?

A woman and child get aboard and the woman gives you a quarter. How much change do you give her?

A man and two women get on board and the man pays all the fares. He hands you a dollar bill. What change will you give him?

Test for Clear Enunciation and Voice Strength

The examiner hands to the applicant for the position of conductor a list of streets and names. He is told to read each one in turn to himself and then announce it as he would to reach all the passengers in a car as large as those used on the system.

Seventh
Seventeenth
Twenty-second
Linnwood
Limmude
Linden Street
Linton Street
Frankford
Tank Road
Rudolph

Test for Prompt Motor Reaction to External Stimulus

The examiner and applicant are seated on opposite sides of a table. The applicant holds his hands, palm down, several inches above the table and as certain commands are issued drops either the right or left hand to the table. The signal to drop the right hand is the order "stop car," that to drop the left will be "start now." The words "steady," "go," "stop car" are then repeated, though not in regular rotation. Failure to drop the proper hand, or to drop either hand at the word "steady" is considered an error.

The discussion was opened with a paper by Dr. Francis Lee Dunham, of Baltimore, Md., which was read by Secretary Welsh.

In introducing Dr. Dunham's communication, President Palmer commended the committee report as valuable in that it opens up new vistas of important and comparatively unexplored fields for further study and research. He explained that Dr. Dunham is a talented physician who has done valuable work in psychiatry, particularly with young people whose mental faculties are under normal. He is largely responsible for some of the admirable laws of Maryland concerning such persons. He is a lecturer at the Johns Hopkins University on social medicine and on probation and delinquency, and is psychiatrist to the Maryland State Bureau of Labor and Statistics, the Maryland State Industrial Schools, and other organizations. Dr. Dunham's paper is abstracted elsewhere in this issue.

The "Interurban Hour"

One of the most lively discussions of the afternoon occurred in the roundtable talk on interurban problems lead by Edward C. Spring, Allentown, Pa. The first topic, meeting highway competition, was treated fully in a paper by D. W. Pontius, Pacific Electric Railway. His discussion is treated elsewhere in this issue. Bert Weedon, Indianapolis, said that the interurbans in Indiana had not yet received full recognition from the commission. He claimed that the electric railways have nothing to fear from bus competition with the advent of proper regulation. In spite of considerable competition the Interstate Public Service Company has not met it with reduced rates, but has, in fact, upheld the high standard of its service. Mr. Weedon said he was never so enthusiastic about the prospects for the interurban roads and revealed that their real problem is to secure sufficient equipment in more favorable territories than that covered by their lines. He believes others can do still better with the freight business than they have.

Garrett T. Seely, Youngstown, Ohio, told of the peculiar conditions under which the Pennsylvania-Ohio Electric Company operates as far as commission regulation is concerned. In Pennsylvania the company has the protection of the commission while there is none in Ohio. Because of this condition the company recently opened a bus line in Ohio between two towns 15 miles apart to eliminate competition. Although the route parallels their rail line, the physical track layout prevented a better running time than seventy minutes. With De Luxe motor coaches it has been possible to make the run in about forty-five minutes and to charge 50 to 100 per cent higher rates.

The next subject, economics of operation, was treated in a written discussion by Clinton E. Morgan, Brooklyn, whose remarks are abstracted elsewhere. J. P. Barnes, Louisville, declared that economics consisted of nothing else than studying the textbook and the public. He claimed that people will always buy service.

Discussion on the problem of getting increased passenger business was then taken up.

F. L. Butler, Georgia Railway & Power Company, Atlanta, presented a paper in discussion of this subject. An abstract follows:

No generally defined course to build up interurban traffic can be followed. Local conditions must largely govern, and our actions must be controlled by the exigencies of the situation and the peculiar conditions surrounding. There is, however, one fundamental idea to be borne in mind. The service should meet, in the most convenient manner possible, the demands and necessities of our patrons and it should be attractive as well. In Atlanta, we have a transportation engineering department—separate from but auxiliary to our transportation department, whose sole duty is the checking of traffic, and the measuring and allotment of service by means of properly built schedules. I am frank to say, however, that we have given much less study along these lines to our interurban service than the situation now demands, and much less than we will be obliged to give in future, if our interurban business is not to be allowed to perish.

Assuming that this matter of service adjustment receives deserved attention, the next important step should have to do with fares. On our interurban lines out of Atlanta the principal revenue is from the commuter, to whom we sell a commutation book good for thirty-five days, containing twenty-seven round trips, at a cost ranging from $8 to $10. This sum represents a considerable outlay for the average individual, and we are now considering the sale of a weekly book, at a proportionately smaller amount, as a step in the right direction.

I believe also we should all give more attention to advertising. The man in the city gets tired of the city just as the man in the country grows stale on country life. Some town along the interurban line may have a local celebration, which to the city dweller may be reminiscent of his more care-free days. If properly informed of the event, the time, the place, and the road, he may be tempted to attend with maybe some one or more members of his family. By the same reasoning, when the city is staging an event of importance, those in the country may be induced to attend if told about it. I do not mean that advertising should be devoted exclusively to special occasions. If there are points of interest along the line they should be played up and kept before the public eye. It pays to advertise your wares in the street railway business the same as in any other business.

Having done all this, we may still have much sparsely-settled territory bordering along our tracks. What can we do to aid in its development? Is it not plain that the thing for us to do is to interest reputable realty men in our problem, and with their aid proceed toward building up the vacant territory we have? It seems to me it is—and this we are doing.

And finally it has been suggested that our publicity department be extended to embrace a sales department for the purpose of selling service. Our gas companies have salesmen; our light and power companies have high-class, high-powered sales engineers. Why is it not logical to assume the necessity for a sales manager whose time shall be devoted to selling rides—particularly on interurban lines—and making two rides take place where only one took place before? He is attached to our publicity department; he has the means of acquainting patrons with coming events and knows the best picnic grounds along the lines, the best athletic fields available, when this Sunday School will have its annual outing, etc., and he is prepared to suggest the time and the place and arrange for the service. The appointment of a sales manager, where conditions will at all justify, is worthy of much consideration. Let us all feel the necessity of stimulating and building up our interurban travel, and by an exchange of ideas covering this subject, I am confident we can meet the situation and conquer it in a satisfactory degree.

The advice of C. E. Thompson, Highwood, Ill., was not to decrease rates or increase service in order to get more business, but first to give real service and then advertise it. He emphasized the necessity, however, of keeping the service just a little ahead and not behind the amount of traffic handled.

F. D. Norviel, Anderson, Ind., opened the discussion on getting increased freight business. According to him the best ways of increasing the business are by personal solicitation, by the use of shippers' guide maps, etc., newspaper advertising and by car and station cards. In relating what the Union Traction Company of Indiana had done Mr. Norviel said that when it was decided to enter the stock-handling business an experienced livestock man was sent into the territory to meet the stock buyers and farmers and to make suggestions as to where stock pens should be placed. This man also worked out with them the shipping problems, schedules and other details. The schedules for this business were broadcasted throughout the farming districts by personal presentation and by placing them in stores and offices along the line. Mr. Norviel remarked that his company is now handling about 200 cars of livestock per month.

In treating the methods used to develop favorable public sentiment a delegate from Duluth said he always attempts to get a selling point in all announcements which the company makes. To publish merely the announcement makes dry and uninteresting reading. Until carefully studying what a railway has to talk about, he said that he did not realize that there was so much which might profitably be brought before the public. Following this method he has compiled a complete file of topics to be used in such campaigns. The amount spent for advertising by the Duluth Street Railway, he said, was one-third of a cent for every dollar of annual gross revenue.

In connection with the necessity of departmental co-operation, H. A. Nicholl, Anderson, Ind., said that nothing paid bigger dividends than co-operation. One way to interest employees is to organize a safety or efficiency committee. The work of these committees should consist largely in handling and acting upon suggestions from their own members or from other employees. Through such committee work employees learn to feel that they have a share in the operation of the property.

The wonderful work in securing co-operation on the Pacific Electric Railway was related. Following the consolidation of the system from thirty-seven small properties there existed a condition tending to tear down the unity of the organization. A Pacific Electric family has been created by the establishment of safety and employee committees, to which every man is invited to present his views and criticisms. This co-operation has resulted in a more complete understanding between management and men, a high degree of morale, and has reacted to the financial betterment of the company.

Following the round-table discussion President Palmer called the past-presidents of the Transportation & Traffic Association to the platform, after which he recited briefly the accomplishments of the association since it was founded in 1908 under the direction of C. Loomis Allen. The past-presidents present were R. I. Todd, D. A. Hegarty and H. A. Nicoll.

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Engineering Association Proceedings

Outstanding Feature of Reports and Discussion Was the Increasing Extent to Which the Association Is Becoming Related in Its Work to Other Organizations — Reports Showed Great Progress in Way, Power and Other Technical Developments

C. S. KIMBALL

L. C. DATZ

A LARGE number of electric railway engineers were on hand promptly to hear the presidential address of C. S. Kimball in opening the convention of the Engineering Association on Monday.

PRESIDENT KIMBALL'S ADDRESS

President Kimball opened his address with a tribute to Chicago as a convention city. He then outlined the important features of the work of the past year, in substance as follows:

Early in the season it was decided, in order to give the different members of the executive committee certain prescribed work, to appoint them as sponsors to assist the chairmen of standing committees, and to preside at a committee meeting when the chairman or vice-chairman was absent. The plan has served to keep the officers and members of the executive committee in close touch with actual committee work.

A plan for a machine for testing rail joints and track structures was discussed thoroughly. It is hoped to secure ample financial support for this within a few months. Recently the director of the Bureau of Standards consented to the locating of the machine on the Bureau property in Washington.

The procedure in adoption of standards is gradually shaping itself into one under which, in the interests of all, proposed standards are referred to the American Engineering Standards Committee. At present many of the association's standards are before this committee, and many of its leading members serve as its representatives at the deliberations of the A.E.S.C. It is important that the Engineering Manual be revised and other standards be submitted promptly to the A.E.S.C., because after Jan. 1, 1924, the present rules for adopting standards are to be changed and the procedure will be less simple.

For many years the subject of detailed cost accounting has been a source of much trouble and controversy, especially between the accountants and the engineers. Under present methods used and prescribed by the I.C.C., the accounts are not so divided that various items may be segregated. This year the engineering accounting committee has prepared a report which suggests means for detailed cost accounting which will eliminate the duplications which now exist.

Following Mr. Kimball, G. C. Hecker read the report of the secretary, J. W. Welsh.

REPORT OF THE SECRETARY

Two features of the year's work, stated Secretary Welsh in his report, were the standardization program and the co-operative work with committees of other national associations. There were sixteen standing committees with a total personnel of 141. A total of thirty-three meetings were held at which the total attendance was 240. During the year four data sheets were sent out as follows: On design of track construction, on helical gearing, on overhead current-collecting devices and on purchased power. Thirteen standards selected from the Engineering Manual by the 1920-1921 committee, and approved by the 1921 convention for that purpose, were submitted to the American Engineering Standards Committee for approval on June 12, 1922. The committee is actively represented on the executive committee of the A. E. S. C. and is participating in the program of national standardization through representatives of nineteen sectional and special committees.

On Aug. 9 the executive committee authorized the appointment of a committee to revise the mechanical form of the Engineering Manual and to supervise future editions with revision of manual sections. This is to consist of three members of the executive committee, having terms of office arranged so that after the first year not more than two new members will be appointed in any one year. The committee appointed for the present year consists of R. C. Cram, chairman; Charles R. Harte and Daniel Durie.

The secretary reported 521 individual members in the Engineering Association and stated that G. C. Hecker, appointed on March 15 as special engineer, has given a considerable portion of his time to the work of the Engineering Association.

A committee on resolutions was next appointed, consisting of H. A. Johnson, C. R. Harte and H. H. Norris.

F. R. Phillips then read the report of the committee on reorganization.

REORGANIZATION OF ENGINEERING ASSOCIATION

The committee appointed by President Kimball to consider suggestions made by Past-President William G. Gove reported that after careful consideration and study of the aim and purpose of the Engineering Association, which fundamentally is and should be an affiliated body of the American Electric Railway Association, the conclusion was reached that the rules and principles upon which the former is founded are sound and permit unlimited latitude to the membership for the development of the electric railway as an industry and business. There appears to be nothing in the constitution and by-laws to prevent the "modernization" suggested by Mr. Gove. It appears that the principal obstacle in the way of reform is that of finance.

The committee felt that several of the conditions complained of by Mr. Gove had been corrected during the year, but the committee made the suggestion that standing committees are required to undertake too much work in a given time. Further, it was recommended that a return be made to the use of letter ballot in passing upon the adoption of recommended practices and standards.

Mr. Gove's criticism with respect to the Engineering Manual has struck a responsive chord. Efforts have been made from time to time to revise the form and subject matter of the Manual, and the committee recommended the appointment of a special committee whose sole duty it should be to modernize the Manual. Further, the committee approved Mr. Gove's suggestion with respect to the manner of adopting standards along the lines followed by the mechanical division, American Railway Association. He had suggested that standards should be determined upon a unit basis, the company voting upon rolling stock matters in accordance with the number of cars it owns; upon power generation and line distribution and affiliated matters, according to the energy output for railway purposes; and upon way and structure matters, according to the number of single-track miles operated. The committee recommended that a suitable resolution embodying this principle be prepared for presentation at the convention, due notice having been previously given to member companies that such a resolution would be presented.

In conclusion the committee expressed the belief that there is no need for a revision of the constitution or by-laws or the form of organization of the Engineering Association in any manner and that all of the criticisms of the conduct of the association can well be met by executive committee action or resolution properly placed before the membership.

This report was signed by F. R. Phillips, chairman; H. H. Adams, L. C. Datz and J. H. Hanna.

A brief discussion of the above report showed favor of the plan for more deliberate adoption of standards and the report was approved.

PAST-PRESIDENTS RECEIVE BADGES

Badges were presented to all past-presidents of the association, those who were present being asked to speak briefly. Mr. Kimball first awarded one to H. H. Adams, referring to him as the "daddy" of the association. He then asked Mr. Adams to make the other awards. Mr. Adams reviewed the history of the association from its beginning in Cleveland, on Feb. 16, 1903. The first of the seventeen presidents was Thomas Farmer. Mr. Adams spoke reminiscently of many of the past-presidents and asked the men present to rise in silence in tribute to the memory of Past-Presidents Lincoln and Baker, who had passed away. The past-presidents present, who responded briefly after the award of the medals, were W. J. Harvie and F. R. Phillips. A medal was also awarded Retiring-President C. S. Kimball. Reference was made to the three names which the association had carried. The first was "American Railway Mechanical and Electrical Association," the next "American Street and Interurban Railway Engineering Association," and the third the present one.

An interesting feature was the presence of G. W. Palmer, a former active member of the association and a vice-president, who had been kept away from the conventions by ill health for five years. He gave some personal reminiscences of the organization of the association, of which he was a charter member. Mr. Kimball paid a tribute to the great value of Mr. Palmer's work to the association.

Following the badge presentation a snappy talk on safety was given by R. M. Reade, Quebec, representing the committee on safety of the Transportation & Traffic Association. His talk was full of enthusiasm. His plea was for right human relationships in promoting safety.

After the talk on safety H. H. Adams presented the report of the committee on unification of car design.

UNIFICATION OF CAR DESIGN

The type of car considered by the committee is for city use, embodying some of the latest practices that are being incorporated in cars of recent construction, and the committee decided upon the following points relative to the design:

Transverse seats to be used with the exception of the seats adjacent to the end bulkhead.

Top sash to be in one continuous piece from corner post to corner post and fastened permanently to each post.

The lower sash to be arranged to raise.

Distance from center to center of posts 29½ in.

Width over posts 8 ft. 4 in.

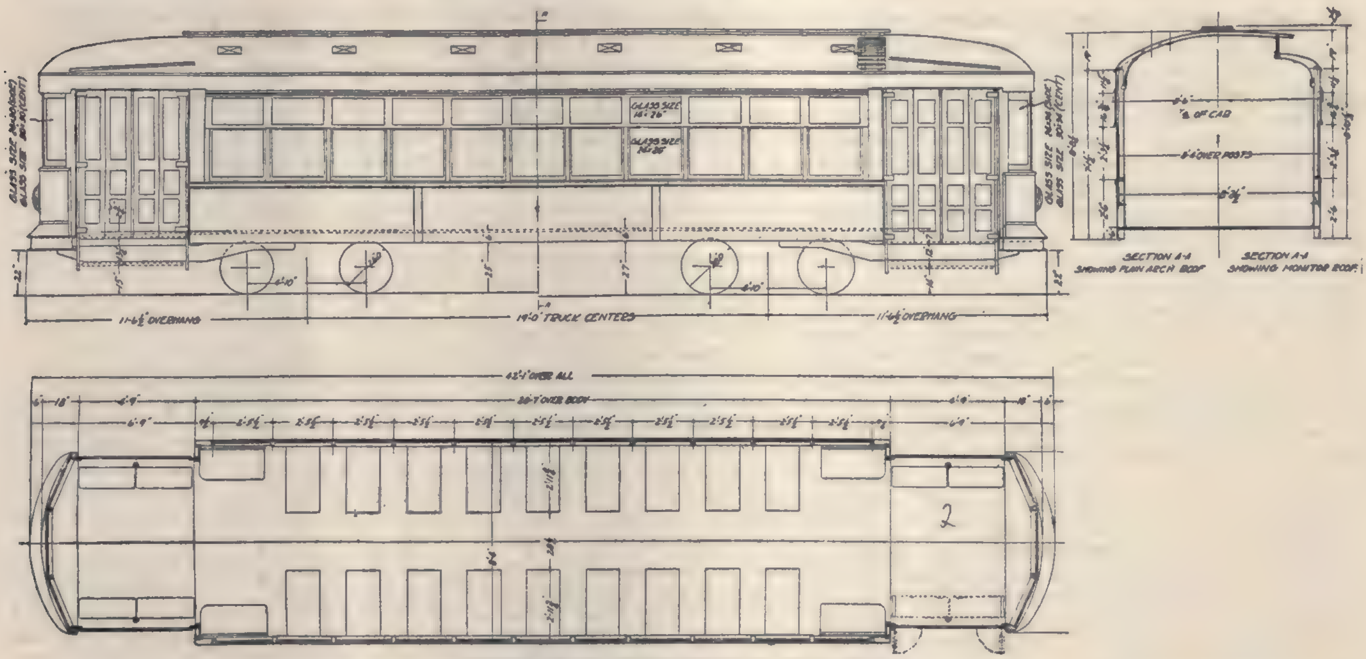
Width over all 8 ft. 6 in.

The side girder construction to consist of steel plate, the thickness to range from No. 14 to No. 12 gage.

The bottom of this side girder to be reinforced with steel angle or an equivalent member and the top of the girder plate with a flat bar. These reinforcements to have sufficient section to meet the stresses imposed upon the same.

Considerable attention given to the question of step heights by the committee, and advantage taken of the progress in the art in motor design, which permits the use of smaller diameter wheels, thus allowing the use of lower steps on cars. It is recommended that if 26-in. diameter wheels are used a ramp be inserted starting inside of the end sill of the car and extending out over the platform, and that only one step be used between the platform level and the top of the rail; the maximum height of the first step from the top of the rail to the top of the step not to exceed 15 in. With cars having a wheel diameter of 28 in. or over, a drop platform is suggested, and in this construction steps even lower than 15 in. can be obtained. It was decided to incorporate on the tentative design, platforms having a length of 6 ft. 9 in.

A design of car showing proposed unification dimensions was submitted for the consideration of the association. This shows a composite design. In the longitudinal side view, one-half of the car is shown equipped with 26-in. diameter wheels, using a ramp to the platform. The other half of the car is shown with 28-in. diameter wheels and with a drop platform. In the sectional view, one-half of the car is shown with an arch roof and the other half with the monitor deck, so as to show the possibilities of the different types of roof construction. These sections show that uniformity of construction up to the top rails can be obtained, and illustrate clearly that it is possible to design cars up to that point and then use either the arch roof or monitor deck, as may be desired. The same type of post may be used in each case. The type of ventilation has been left open, as this is in itself a subject which would require extensive study.



DESIGN OF CAR WITH UNIFORM DIMENSIONS

The design of this car shows eleven windows, with a total length of 42 ft. 1 in. over bumpers. The thirteen-window car would have a length over all of 47 ft. The seating capacity of the eleven-window car, not including the platform seats, is forty-four, and with the thirteen-window car it would be fifty-two. The design shows an arrangement of platform seats. This, however, the committee believes should be left open for the specific type of car to be used.

The design shows specifically one width of 8 ft. 4 in. over post and 8 ft. 6 in. over all at the drip rails, with an idea that this type of car would be desirable for such properties as can accommodate this width. These dimensions conform with the general average obtained as a result of the questionnaires sent out by the committee and contained in the report which was presented at the 1921 convention. The committee considered it advisable to submit a design covering this width of car with an idea of developing a discussion as to the desirability of designing cars with other widths. Standard sizes of glass are used for the windows in this car.

The committee recommended for approval the following dimensions as the preliminary step in obtaining uniformity in dimensions and design of double-truck cars for city service:

Center to center of posts	29½ in.
Height of window opening from window rail to bottom of the lower rail in top sash	27½ in.
Height of car from bottom of sill to top of roof	8 ft. 8½ in.
Height of car from bottom of sill to bottom of top plate	7 ft. 1½ in.
Height of girder plate	30 in.

A stress diagram, giving the method of figuring the stresses in the girder of the car, also formed a part of the report. (Note: The stress diagram shows 12,000 lb. per square inch stress at the door post section. The committee is of the opinion that this is a little high and that it will be advisable to use either a heavier section of channel than called for or to reinforce the same with a plate, so as to bring this stress down to 10,000 lb. per square inch. Shortage of time did not permit the above as a correction on the diagram.)

In connection with the work of the committee on unification of car design in joint session with the committee on one-man car operation on the question of car design and the demand for the greater use of cars operated by one man, the following resolution was adopted by the joint committee:

"The present car of the single truck, light-weight, one-man type has its economical limitations. In semi-congested districts there is a demand for a car somewhat larger than the present smaller car and with either single or double passageways. There is likewise a demand for a car of still larger capacity for one-man or two-man operation as triffic conditions require. The committee believes that in the design of such cars it is desirable to provide liberal widths of aisle and passageways so as to facilitate the movement of passengers in interchange and toward the rear of the car."

The report was signed by H. H. Adams, chairman; H. A. Benedict, J. A. Brooks, J. W. Hulme, G. L. Kippenberger, John Lindall and V. R. Willoughby.

DISCUSSION

In the discussion of the report on car design Mr. Adams said that the Chicago Surface Lines had built a car along the lines as given in the report. This sample car was shown on the pier. A communication from R. C. Cram was read in which he emphasized the importance of designing car ends with due reference to the design of special trackwork. The subject should be considered jointly with track engineers.

F. R. Phillips spoke of the important bearing which this report is apt to have on the industry, and advised caution in the adoption of car standards. He said that the center-entrance car lends itself well to light-weight design. It is also effective in handling mass transportation. With a front exit it provides three effective entrances if desired. As to width of car, this is affected by conditions and it is difficult to standardize width. Further, any recommendation with respect to motive power is dangerous. The characteristics of the route should be considered. In Mr. Phillips' opinion it would be unwise to approve the report at this time.

H. G. Percie urged the importance of standardization in roof construction, particularly with reference to roof profile or contour. This would facilitate the furnishing of headlinings, etc., by manufacturers.

In rebuttal of criticisms Mr. Adams said that the committee had in mind the importance of co-operating with way engineers. This will be taken care of. As to Mr. Phillips' criticisms, Mr. Adams pointed out that the proposed design was based on a questionnaire. The committee took the double-end car as a starter, as this seemed to be in most general use. It is, of course, impossible to design a car that will meet all requirements, but many of the suggestions of the committee ought to prove useful.

On recommendation of Mr. Harte the report was accepted with thanks and with the recommendation that the work of the committee be continued.

The report of the heavy electric traction committee was presented by A. H. Armstrong in the absence of Mr. Withington, the chairman. An abstract of this report follows:

HEAVY ELECTRIC TRACTION

The report of the committee on heavy traction began with a statement of what had been done to obtain co-ordination of work with other associations interested in heavy electric traction in order to increase efficiency of committee work in this field. The subject was taken up with a number of organizations, with the suggestion that a central organization be provided to coordinate the work of studying electrification problems and of collecting information in order to avoid duplication of effort. The committee did not have in mind any premature attempt to standardization or discussion of questions which might embarrass the management of electrified railroads or of railroads contemplating electrification. Many of the organizations expressed interest in the proposal and all agreed as to the value of co-operation. It became apparent, however, that if such a movement is to be successful, it should be under the leadership of the steam railroads.

The committee reported that it is not improbable that the steam railroads will before long see the necessity for a joint committee on electrification. If this is the case, the desirability will undoubtedly soon be felt of calling upon all associations and organizations having technical knowledge of value.

The principal parts of the report were the appendices containing information on electric locomotive tonnage and mileage, details of foreign electrification, electrical operating data of the principal American railroads, and the supplementary bibliography on heavy electric traction, bringing the references up to June 30, 1922.

This report was signed by S. Withington, chairman; A. H. Armstrong, R. Beeuwkes, H. W. Cope, J. C. Davidson, J. H. Davis, J. V. B. Duer, C. H. Quereau and L. S. Wells.

DISCUSSION

C. R. Harte, in discussion, said that it was most unfortunate that the railroads prefer to go their own way. This makes it difficult to do other than has been done in this report, which is admittedly a meager report. The committee, however, is making a record not otherwise available and it is advisable to keep the committee at work until steam men can see that the A.E.R.E.A. can help them. Mr. Harte said that he thought this committee could very advantageously take up more intensively the study of heavy interurban electrification. This is surely within the province of this association.

H. H. Norris expressed disappointment that the steam railroad men thought the electric railway men were "butting in." Naturally the Engineering Association has no intention of assuming their prerogatives, but at the same time, the electrification of railroads being an electrification problem, electrical men are interested in it. It must be remembered though that this committee's principal duty is to serve the engineering association, to keep that association posted on heavy traction matters.

In a written discussion W. S. Murray strongly indorsed the work of the committee in its graphical presentation of electrification data. The principal point in Mr. Murray's discussion, however, was a plea for manufacturers to get together on some one system of electrification. Electrification is being kept back because each manufacturer damns (at least by inference) the other manufacturer's system. As a matter of fact either of the two systems is better than steam. It is the "wealth of choice" which is the very thing that kills electrification. However, Mr. Murray thinks he sees signs of a meeting of viewpoints between the manufacturers on this question.

William Arthur said the report was lacking in one respect. As an organization the A.E.R.E.A. is primarily interested in street railways, but secondarily in heavy electric traction. It is a great pity that in addition to tables there is not given a résumé of progress, understandable by one not experienced in heavy electric traction. He also urged that as engineers the committee should present an impartial engineering report free from manufacturers' influence or what might be called a political slant. The committee at least could show that there is no railroad in the country which could not be electrified by one system or another, and this should clear up the question in the minds of the steam railroad men.

N. W. Storer said he was disappointed in the report, coming as it did from men of the calibre of men such as those on the committee. The committee should at least review the literature of the year and bring out the salient points for those who naturally do not have the time to read everything.

F. E. Wynne pointed out that the data showed that roads having the least mileage showed the greatest locomotive tonnage per mile, and that the data covered such a variety of electrifications that the derived figures for tons of electric locomotives per electrified track-mile may be useful for quickly approximating locomotive tonnage required by similar proposed electrifications. Recent orders and immediate plans for additional electrified trackage coupled with existing railway conditions make it reasonable to expect further and increased activity in railroad electrification. Referring to foreign electrifications, data on which the committee should secure next year, Mr. Wynne pointed out some recent orders, commenting upon the receipt by American manufacturers of orders for some of this material.

"Apparently," said Mr. Wynne, "future extensive electrifications will employ overhead contact lines to the exclusion of the third rail." He suggested that the committee make a study of catenary lines looking towards a reasonable degree of standardization. There are two subjects on the border between heavy and light traction which the committee might consider. One of these is the electrification of branch lines and small more or less isolated steam roads. The other is the handling of freight on interurban railways. Mr. Wynne showed the logic of tackling both of these subjects.

A. H. Armstrong said it was disconcerting that Europe is outstripping the United States, particularly when consideration is given to the relative financial conditions of Europe and the United States. Mr. Armstrong said he knew of only one instance in the United States in which electrification was held up on account of the "battle of the systems." Sustaining the committee in its report he said that if the committee were instructed to report on what one system were best it would have done so—it would not shirk its duty—but the report, according to the instructions, was well done. Fundamentally electrification on a nationwide scale must be done on one system, but there is now an *impasse* because no one system has been agreed upon. It is worth while continuing the work of the committee so that history may be written as facts, and so that the decision when made may be on the basis of facts and not opinion.

H. A. Johnson in presenting a preliminary report of the subjects committee made three principal recommendations. One was that joint sub-committees be avoided and that special committees be appointed instead. The second was that since the American Engineering Standards Committee has now adopted the principle of not passing on specifications without formal section action, any specification now contemplated should be submitted to the A.E.S.C. with the recommendation that it be worked out under the sponsorship of the A.E.R.E.A. He recommended further that each committee go through its standards and submit those which should be made "American Standards" for action by the A.E.S.C. before Jan. 1, 1924, as action can be taken up to that date on present standards without referring to special sections. The third recommendation was with reference to heavy traction, largely indorsing the proposals previously voiced; that the committee revise and keep up its records; that it study branch lines, self-propelled cars and storage battery locomotives for yard service; and that it review the past three or four years work—principally from the interurban standpoint.

Tuesday Session

A joint meeting of the Engineering and Accountants' Associations was held Tuesday afternoon. This was opened by a short address on safety work by Fred M. Rosseland. The general theme of Mr. Rosseland's address was that the way to prevent accidents is to get at the cause at the original source and eliminate it. He gave examples of accidents resulting from runaway cars and showed how beneficial results were obtained as soon as the cause was determined and removed.

The report of the joint committee on engineering-accounting was then presented by C. R. Harte, co-chairman. It is abstracted below:

ENGINEERING ACCOUNTING

As the committee on engineering accounting was appointed late in the year, the committee made a preliminary report and recommended that the subject be given further consideration.

The report pointed out that cost collection and compiling, either by an engineer or an accountant, should be carried out with a view to furnishing a complete and concise statement that would be satisfactory both to the accountant for his reporting and to the engineer for many purposes. That the present method of dividing the aggregate departmental expenditures of an electric railway is unsatisfactory and insufficient for the engineer is fairly well established. The natural consequence is that the engineer compiles his expenditures along separate lines, with corresponding duplication of cost and effort. In the committee's opinion the I.C.C. division of accounts falls short of giving the engineer the desired results and fails to aid him in attaining his highest efficiency.

It would seem logical that, if the accountant were furnished with specific details of all the operations of an engineering department in such a form that the figures could be easily recorded and readily understood, it would be cheaper and more efficient for the accountant to handle the matter. To enable an engineering department to furnish these details it is necessary that all items of work be known and stated definitely, so that it will understand how to list and to describe the various items for recording.

The committee made as the principal part of its report a classification of codes prepared by Herbert Jackson and used by the Washington Railway & Electric Company in reconstruction work during the past two years. This conforms to the I.C.C. classification, but is grouped according to natural divisions of the work of the way department. It has permitted the keeping of a close daily check on expenditures against major reconstruction jobs on the underground conduit tracks in Washington, D. C. Appended to the report were reproductions of a large number of forms used by the Washington company.

The report was signed by C. R. Harte and H. C. Kimball, co-chairmen, and L. R. Brown, J. C. Collins, G. F. Dinneen, H. Jackson, C. H. Lahr and F. H. Sillick.

The above report was accepted after a brief discussion of some of the important points, particular emphasis having been given to the necessity of special assistance to foremen and other field men responsible for original distributions.

E. D. Dreyfus, Pittsburgh, Pa., then presented extracts from his paper upon the general subject of the relationship between the engineering and accounting departments. This paper, which is abstracted elsewhere, was the subject of considerable discussion. It appears that there has been a feeling on the part of some of the accountants that their requirements had been somewhat subordinated in the past, and this matter was brought out rather forcibly by some quotations. It developed, however, that both branches of the industry are now manifesting a desire to co-operate, with a view to permanent coordination of work. It was the general opinion among engineers and accountants alike that considerable good had already been accomplished along these lines.

The general trend of the discussion appeared to suggest the desirability of including, among the larger organizations at least, a so-called liaison officer to act for both departments. Some of the members suggested that accountants should act with the engineering department for the purpose of verifying distributions at the source, while others mentioned the employment of engineers by the accounting departments, such employees to report direct to the auditor. There seemed to be some difference of opinion, but it appeared that some good has resulted from these discussions.

Emphasis was also given to the necessity of accurate monthly analyses of charges, and the matter of cost accounting was also mentioned.

After the discussion of Mr. Dreyfus' address was concluded, the members of the Accountants' Association retired to their quarters. Their subsequent proceedings will be covered in a later issue of this paper.

After the retirement of the accountants the engineers took up the report of the committee on equipment, which was presented by R. H. Dalgleish, chairman.

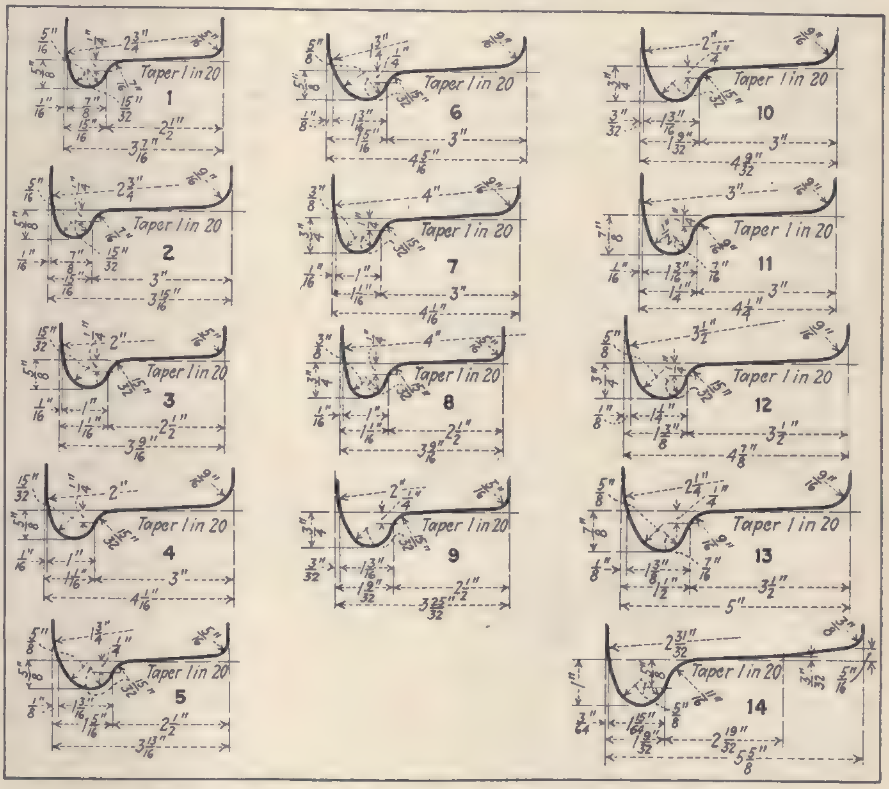
EQUIPMENT

The committee reported on nine subjects as follows:

1. Continue the study of wheel contours for cast iron wheels, co-operating with committee on way matters. Fourteen contours for chilled iron wheels were submitted. These contours had been approved by the manufacturers of chilled iron wheels.

1A. Same as No. 1 except for steel wheels. Contour D2 was added to the contours submitted by the committee last year, making a total of nine contours. A table showing dimension of wheels for this contour was also submitted. Recommendation was also made that the hub diameter of 36-in. wheels be increased from 9½ in. to 11 in.

2. Continue the study of helical gears. Replies to a questionnaire sent out by the committee showed that a majority of the helical gears now in service have 7½-deg. angle. From information available there are now about 33,000 sets of helical gears in use on electric railways. The committee considered it important that the angle and form of tooth be standardized as soon as possible, and recommended that the subject be continued.



TREAD AND FLANGE CONTOURS FOR CHILLED-IRON WHEELS

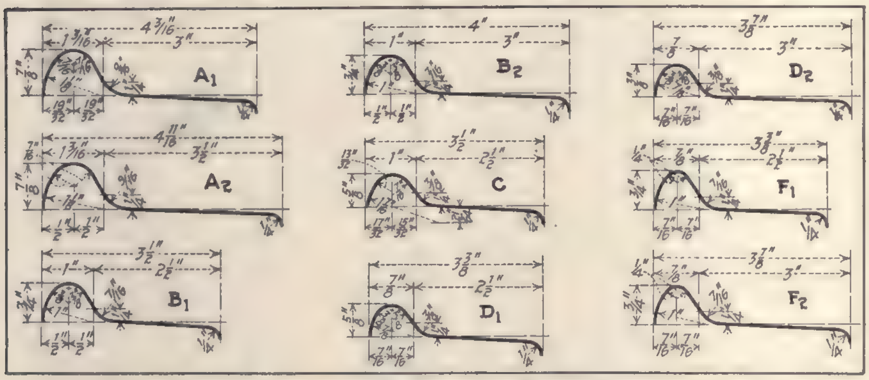
3. Representation on sectional committee of American Engineering Standards Committee engaged in preparing a specification for lightning protection. The committee's representative was not informed of any meeting of this sectional committee.

4. Continue co-operation with committee on buildings and structures on design of typical shop building and shop layout for property of moderate size. Recommendations of the committee were included in the report presented by the buildings and structures committee.

5. Investigate possible advantages of curved contours for treads of new wheels, co-operating with committee on *way matters.* The equipment committee did not approve the curved treads for new wheels. The report stated that it is difficult to turn wheels in the present lathes to a curved contour and, inasmuch as the wheels form a curved contour after about 600 miles of service, the committee considered it undesirable to turn off this metal and prefers to have it rolled in.

6. Study the various devices for trolley contact and the effect upon trolley wire, including a report on the economics of current collecting devices on overhead contact wires and with special regard to the maintenance of the collecting devices and the maintenance of the contact wires. The committee submitted an analysis of answers to a questionnaire, but no definite conclusions or recommendations were included.

7. Representation on sectional committee of American Engineering Standards Committee engaged in preparing specifications for wires and cables. The equipment committee was represented on the sectional committee and reported progress along the line of standardization.



TREAD AND FLANGE CONTOURS FOR STEEL WHEELS

8. Study National Electrical Safety Code with special attention to sections relating to car equipment. The committee reported that such a study had been made and that the sections referred to appear satisfactory.

9. Study existing standards and specifications with a view to possible revision. The committee recommended that the height of car platforms and bumpers be changed. Also that a limit-of-wear gage for ⅞-in. flange be added. A 3-in. x 6-in. journal, with journal wedge, bearing and thrust plate, was added for use with the safety-car axle. The radius of the inside and end journal bearings was changed. The committee recommended that the E1 axle be eliminated and a new axle adopted, also that the radius of fillet on the present axle be changed. A recommendation was made that the specification for cold-rolled axles be eliminated and a specification as submitted for a hammered axle be adopted. Tolerances for motor and gear seats on axles and also tolerances for gear bore were submitted.

The report was signed by R. H. Dalgleish, chairman; W. S. Adams, H. A. Benedict, A. H. Daus, L. J. Davis, Daniel Durie, J. L. Gould, Stewart Hazlewood, J. M. Hipple, Robert Long, A. J. Miller, M. O'Brien, E. D. Priest, C. F. W. Rys, P. V. C. See and C. W. Squier.

In the discussion of the report on equipment, subjects 1, 1-A and 5, relating to wheel tread and flange contours, were considered at one time. A written discussion by H. H. George was read by G. C. Hecker. In this discussion Mr. George said that he does not think it advisable to adopt as many contours as were proposed.

The resolution of the standards committee regarding these three subjects, that the incoming Engineering Association executive committee appoint a special committee, consisting of representatives of the equipment and the way committees, together with manufacturers of wheels, rails and special trackwork, to study wheel and rail contours, was approved by the association.

In discussing subject No. 2, relating to helical gears, H. H. Adams introduced a resolution that the equipment committee be instructed to study the whole subject of gearing. This was approved.

Speaking with reference to the part of the report of the committee dealing with trolley contact devices, M. B. Rosevear and C. R. Harte said that they thought that wear on trolley wire should be considered at the same time as the study of contact devices, and suggested that in the assignment of future subjects a joint study be made by the equipment and power distribution committees.

After discussion of the standards recommended by the equipment committee, the gear seat on the axle recommended by the equipment committee was increased from 1½ to 2½ in., instead of the recommended value.

The recommendations of the standards committee in regard to the various parts of the equipment committee's report were also approved and the report of the committee on equipment was accepted with thanks of the association.

The report of the committee on buildings and structures was presented by Frank H. Miller, Louisville, Ky., chairman. It comprised four subjects, and is abstracted below.

BUILDINGS AND STRUCTURES

The committee first considered the design of a typical shop building and layout, a subject continued from last year, and used the 1921 report as a basis. The two typical layouts, one for 150 cars and the other for 250 cars, submitted by last year's committee were changed in each case by the addition of a steam railroad connection to the system of tracks. Plans of several existing shops were included as additional information. The statistics of fifteen shops given are republished in the table on the opposite page.

The committee recommended that the plans of the typical layouts be adopted as recommended design for electric railway properties of moderate size.

In the portion of its report on culverts and small bridges, the committee states that the types of structures available for culverts are: Vitrified pipe, up to 36 in. diameter; cast iron, from 24 in. to 34 in. diameter; reinforced concrete, from 18 in. to 84 in. diameter, and corrugated iron, from 8 in. to 84 in. diameter. It says that the use of vitrified pipe should be avoided, as experience has shown that it does not stand up under service satisfactorily unless in shallow fills, and corrugated iron is recommended only for this kind of fill, as it has not been manufactured long enough so that its lasting qualities are definitely known. Drawings are given of different designs of culverts, bridges and trestles. In computing the stresses of the various members of bridges and trestles the report recommends that on interurban electric roads where steam railroad freight cars are hauled the calculated live load should be that of two 200,000-lb. cars, while for an electric railway handling only passenger service, a live load should be of two 100,000-lb. passenger cars fully loaded with 125 passengers each, or a total load per car of 120,000 pounds.

The committee continued the study of wood preservation, but found that not much progress has been made since the report of the 1921 committee. It sent out a questionnaire to thirty-eight of the larger companies. Of the twenty-three that replied, only four used the pressure process and eight the brush treatment, or else purchased treated lumber from wood preserving companies. The committee recommended that the study of wood preservation be continued by next year's committee and did not recommend the revision of any of the existing buildings and structures standards.

The committee was: F. H. Miller, chairman; E. H. Berry, N. E. Drexler, H. H. George, J. D. Kent, James Link, Robert Long, J. R. McKay, L. C. Mayer, L. L. Newman, J. N. Penick and S. H. Steiner.

In the discussion, the subject of shop design and layout was covered by N. E. Drexler, Hampton, Va., in a written contribution. He urged that the designer should give the fire protection and prevention phase of the layout careful study to keep the insurance rates as low as possible. With respect to the arrangement of departments, he indorsed the committee's ideas, namely, that it is extremely desirable for a

TABLE SHOWING AREAS OF SHOPS AND PERCENTAGES OCCUPIED BY DIFFERENT DEPARTMENTS

Railway	Total Shop Area, Sq.Ft.	Number Cars (a)	Sq.Ft. per Car	Percentage Occupied by— Overhaul and Trucks	Machine Wheels and Axles	Smithy and Welding	Air Brake	Office	Armature Room	Carpt. and Mill.	Paint Shop	Paint Mixture	Sand Blast	Store Room	Oil House	Wash Room
Montreal Tramways	112,052	770	145	17.9	11.5	4.2	0.2	1.7	5.2	18.2	26.0	0.6	...	10.2	0.6	3.7
Milwaukee Electric	284,600	1,150	247	19.0	7.8	5.7	1.5	2.8	7.4	22.5	17.4	1.0	..	13.9	....	1.0
New York State Railways, Syracuse	65,999	214	308	30.2	6.0	1.8	...	2.6	2.3	21.9	19.4	0.3	0.7	11.9	1.1	1.8
Pacific Electric, Torrance	296,880	(b) 1,937	153	14.7	8.6	4.4	0.3	1.0	5.4	24.1	24.8	0.8	1.8	12.1	0.8	1.2
Union Traction, Anderson, Ind.	79,710	294	271	21.6	4.2	4.0	...	1.5	4.0	25.9	15.4	3.0	...	15.3	3.0	2.1
United Railways & Electric, Balto.	243,400	1,453	167	16.2	7.4	3.8	...	4.1	6.1	26.2	16.7	2.5	...	12.5	2.5	2.0
Birmingham Railway & Light Co.	48,508	307	158	18.9	15.5	3.1	...	3.3	3.6	22.0	19.1	0.7	...	8.7	2.0	3.1
Georgia Railway & Power Co.	64,204	321	200	31.0	7.1	2.3	...	1.8	1.5	25.5	19.2	0.4	...	6.9	0.9	3.4
York Railways, Penna.	20,324	79	257	34.2	7.1	2.8	...	2.8	2.8	19.9	14.2	2.8	...	9.5	1.1	2.8
Knoxville Railway & Light Co.	16,046	76	211	33.2	8.2	5.2	...	1.6	2.5	19.6	18.1	...	....	8.1	1.0	2.5
Louisville Railway	128,210	616	208	20.2	7.7	2.3	...	0.7	2.9	29.1	22.4	0.7	...	12.7	0.3	1.1
Virginia Railway & Power Co.	33,570	165	204	30.0	7.0	2.3	...	1.2	4.5	14.6	16.1	....	...	(c) 23.8	0.5	....
Dallas Railway	34,509	181	191	24.6	8.5	3.7	...	1.1	1.8	18.7	22.3	....	...	10.1	1.3	7.7
Newport News & Hampton	20,125	103	195	27.4	12.4	5.2	...	0.4	6.0	19.9	11.9	....	...	14.1	1.7	1.0
Portland Railway & Light Co.	142,950	1,032	139	21.8	7.8	5.2	0.3	0.3	3.9	24.6	19.6	0.7	2.6	12.3	....	0.9
	1,591,107	8,698	3,054	360.9	126.8	56.0	2.3	26.9	59.9	333.7	282.6	13.5	5.1	182.3	16.8	34.3
Averages	....	....	203.6	24.0	8.5	3.7	0.6	1.8	4.0	22.2	18.8	1.2	1.7	12.2	1.3	2.5

(a) Number of cars for which shop was designed. (b) This includes a large number of freight cars. (c) Storeroom at Norfolk includes space for supplies for Lighting Department.

property of moderate size to have as few isolated departments as possible. Furthermore, it is important that the departments be so arranged that there will be no unnecessary handling of material. In regard to the application of the design to various sized properties, he called attention to the fact that the size and shape of the plot of ground available may prohibit the use of a typical layout, but the figures prepared by the committee can be used to determine the total space required and to distribute it among the different departments.

H. H. George, Newark, N. J., sent in a written communication, in which he said that the report of the buildings and structures committee represents the first real progress on the subject of small bridge and culvert design, and that it was to be regretted that in making its recommendations on this subject the committee was not more definite so that the standards committee could have taken appropriate action on it prior to the convention. He said it is also to be regretted that, although in assigning that subject to the buildings and structures committee for consideration instructions were given to cooperate with the way committtee, no such instructions were issued to the way committee, and consequently the latter had no sub-committee to work on this subject.

There are a few minor points to which he called attention. A statement is made in the report that the use of vitrified pipe does not give satisfactory service unless in shallow fills. It has been his observation that the use of vitrified pipe in very shallow fills has almost invariably resulted in failure due to too high live load concentration. In moderately high fill vitrified pipe has occasionally given good service, but it is not to be depended on to the same degree as cast iron or corrugated iron pipe manufactured under the specifications which insure practically pure iron and where the necessary precaution is taken to insure obtaining metal of the proper gage through the entire length of the culvert. There is no question in the case of corrugated iron pipe as to its mechanical strength, but merely its ability to resist corrosion.

One point which he emphasized strongly in connection with the use of pipe culverts of any kind was the necessity for installing adequate head walls on the upstream end of the fill. These are especially necessary where there is any liability of the pipe discharging under a head. Without the head wall washouts are almost sure to occur under this condition. Another point which should be brought out is the attention which should be given to backfilling on pipe culverts. This should preferably be of some impervious material, which will tend to prevent seepage of the water along the outer walls of the pipe. Under no circumstances should cinders be used for filling around pipe culverts, especially in the case of corrugated iron, as these cinders almost invariably contain a considerable amount of sulphur and in the presence of water is very destructive to the metal.

He also suggested that it would be very desirable to add curtain walls to the design of a concrete box culvert, shown on Fig. 22 in the same manner as was done in Figs. 23, 24 and 25 of the report.

The discussion on Subject No. 2 of this report was continued by a written contribution from R. C. Cram, Brooklyn, N. Y. Comments were made in relation to some of the designs submitted. Attention was called to the desirability of spacing these double beams, shown in Fig. 6 of the report, so that their flanges would have space enough between them to permit ready painting and inspection. Also, if the beams are kept apart the accumulation of dirt and other foreign substances will be prevented, thus aiding the wind and sun in preventing or lessening corrosive action.

Under Fig. 28 of the report it is noted that dowels are not provided for holding caps in place on piles and for holding stringers in line on caps. Dowels are essential and should be used, especially where stringers are not dapped over caps.

No data are given as to lengths of bridge ties, which should be of standard sizes and lengths. The tie spacing should be indicated also on all drawings.

In connection with the use of wooden stringers, the importance of using other than wood spacers should be noted and the open space between faces of stringers might well be indicated. This should never be less than 2 inches.

The standard spacing of timber guards and the proper spacing of inside rail guards might be indicated, although the practice or requirements of bridge authorities representing state bodies may prevent setting these out in the designs.

The importance of using creosoted timber in such framed structures should be emphasized as greatly lengthening the life of timber trestles.

There is some question as to using the loading diagram Fig. B, page 21. This is different from that used in the Massachusetts Railroad Commission Specifications prepared by Prof. G. F. Swain. The latter uses a spacing of 5-15-5 instead of 7-13-7 shown in Fig. B, and there are many cars still in city service which give the 5-15-5 spacing or very near it. This matter should be inquired into further and the requirements of the various state authorities in bridge design matters for electric railways should be made a part of the report.

While the report emphasized the fact that a strictly mathematical solution of the size of a culvert is not possible, J. R. McKay, Fort Wayne, Ind., said that it must be remembered that the lack of intelligent treatment has all too frequently resulted in openings which were too small, with ultimately one of two consequences, a washout or replacement by a larger structure upon the insistence of county or other constituted authorities. In weighing the factors which determine the required waterway, it is possible to make use of ready sources of information, as for example the weather department which has data upon the rate of rainfall covering almost every section of the country.

The inclination of the bed of a culvert has much to do with its discharging capacity, he claimed. All too frequently the opportunity to make use of a greater slope is lost sight of as evidenced by the numerous culverts in existence with a decided drop-off on the downstream side. But to incline the bed without sufficient outlet or channel below to allow the water to get away is useless.

Pipe culverts, especially vitrified, for electric or other railways, "have been weighed in the balance and are found wanting." Of course for small openings because of their relatively low initial cost, they will always find more or less favor. Well constructed head walls, cement joints, a well rammed back fill of a minimum depth of 3 ft. are some of the factors in their successful use.

In recent years reinforced concrete and corrugated pipe, of larger sizes than formerly, have been used. Their application has been more frequently open steam lines, especially the reinforced pipe, as electric railways are not as a rule equipped with cranes of sufficient capacity to handle their excessive weight economically.

Scrap boiler shells are being used in embankments which are not too wide or deep to prohibit their effective use. The cost of this type of culvert is much less than any pipe of the same capacity.

In plain and reinforced concrete box culverts the design of the ends should be made with care so as not to retard the flow. The wings of the upstream end may be flared 90 deg. or from 30 to 45 deg., while the downstream end may or may not have the wings flared.

Open box-type culverts are usable only when the foundation is very firm or where it may be necessary at some future time to lower the bottom, in which case it is at least advisable to use baffle walls in place of the solid floor. The baffle on the downstream end should be deeper than the others to prevent scour, with the consequent undermining of the footings. For this same reason it is advisable to drop the wall on the downstream end of the closed box type culvert at least 3 ft. below the balance of the floor.

Box culverts are superior to arch culverts for several reasons, all of which affect the cost materially. Among them are: (1) The space required to build a box culvert is only a few feet wider than the span; (2) it does not concentrate the load on the foundation as does the arch; (3) form work is more simple. Arches are for the most part, as indicated in the report, used where artistic design is especially desirable. They are also more economical in high fills, as under such conditions a slab of considerable thickness is required in box culverts.

Rod reinforcing is to be preferred in reinforced concrete culverts. The use of rails as reinforcing is at variance with the theory of reinforcement and they are not of the right form. When used they are considered as plain beams, the concrete serving to prevent deterioration. Because of the lack of a market and the low price of scrap rail, recently this type of culvert has been used to greater extent among electric railways.

The range in results among the details of design is about as varied as are the ideas and assumptions of the individual designers. Recent handbooks and texts on concrete treat more thoroughly upon the theory. In addition actual laboratory tests in the engineering experiment stations of our state universities furnish valuable information, notably that of Iowa on the effect of the depth of fills of various materials upon pressure on pipes.

Mr. McKay felt that the tendency is more and more toward making each culvert a special case. Electric railways are not now building culverts in any large numbers and it is therefore possible to study each one carefully. He has found that after careful consideration there is always some special problem warranting the effort and cost and that therefore a standard design is of little use except to secure some sort of uniformity in appearance, the necessity of which is more or less imaginary or to indicate the practice of others.

S. J. Steiner, Aurora, Ill., a member of the committee, explained that in considering the subject of small bridges, culverts and trestles, with a view to presenting information for good current practice, the committee's first task was to decide on an interpretation of the exact scope of the assigned subject in so far as it pertained to small bridges; in other words, what is a small bridge?

After a great deal of discussion it was decided to class as a small bridge a structure which could be built by the ordinary organization of the maintenance of way department of an electric railway without any outside help in the fabrication of the material, such as the steel required for plate girders or trusses. Accordingly it included in its report designs for pipe culverts, box culverts, timber trestles, arch culverts and short I-beam spans.

In making any design of a railway bridge, the question of live load is naturally of prime importance. Due to the great range in weight of equipment on various roads, it is known that the proper live load to be used in designing a bridge for one road may be far in excess of that suitable and adequate for another road. Based on the live loadings as derived from the equipment operated, electric railroads are divided into three classes:

1. A city street car system operating cars of from 30,000 to 60,000 lb. weight when empty.
2. An interurban system operating heavy passenger car equipment weighing up to 100,000 lb. empty, but which does not operate any steam railroad freight equipment.
3. An interurban system operating heavy passenger equipment as well as steam road freight equipment.

In designing any structure, naturally it is necessary, he said, to keep the cost down and eliminate any extra expense. It certainly is unwise to design for a loading very far in excess of what the bridge will ever be called upon to carry. However, in some cases only certain members of a structure need be increased in size for the accommodation of a heavier loading and the cost of the work is only slightly affected. The question then resolves itself into whether it is worth a small additional cost in order to take care of a probable future requirement. Each road must necessarily design its bridge openings for its own conditions. The committee believed that the two live loadings proposed by the committee are fair and representative and either one or the other should be used, depending on the type of service.

Wednesday Session

The meeting of the Engineering Association, on Wednesday afternoon was opened by a short address on safety work by H. H. Buckman, United Lead Company. Mr. Buckman stressed the importance of getting suggestions from employees as to how to prevent accidents and he said that even though these cannot be acted on immediately, frequently circumstances occur later where they will be found of great value.

The report of the committee on way matters was presented by W. F. Graves, chairman.

WAY MATTERS

The report presented by the committee on way matters was a treatise of considerable length and great detail. In spite of its volume it was easy to follow because the topics were treated in a uniform manner, the material being subdivided, in general, under these heads: Previous consideration of subjects; progress reports; conclusions; recommendations. The topics covered were so numerous that it will be convenient to refer to each under a suitable heading as below:

Standardization of Frogs and Car Clearance Easements.—As to the standardization of frogs, the committee concluded to disapprove the plan for standardization of frogs for double-track branch-offs shown in the 1921 report, but concluded that further study should be given to the subject. Car clearance easements were considered necessary as a means of facilitating car operation at congested points, and 6 in. was concluded to be a safe working distance between cars at all points in a special trackwork layout. It was pointed out that a change in the design of the inside rear and front corners of cars would make a difference in the design of special trackwork and consequently in the overhang of the curb corners as well as in the entrance clearances. It was therefore recommended that this subject be called to the attention of the committee on unification of car design, with a view to altering the design of cars to facilitate economical design of special trackwork layouts. It was recommended that the tables and drawings covering car clearance easements submitted by the 1921 committee be published in revised form and adopted as "Recommended Design"; further, that sample plans be published as information.

Proper Location of Tongue Switches in Crossovers and Turnouts.—The committee presented diagrams to indicate the proper location of tongues in switches, and recommended that switches be located on the inside of the curve for lateral switches and on the right-hand side facing the switch for wye switches. Wye switches should have a straight guard at the toe of both switch and mate. The diagram submitted was recommended as a "standard design."

Curved Contours for New Wheels.—In introducing this subject the committee quoted an 1884 M.C.B. Association report as follows: "We have the curious condition of things, that forms of rail have been designed by one set of men and the wheel treads and flanges by another, apparently without any reference to each other." Up to the present time, continued the way committee report, the American Electric Railway Engineering Association has handled this subject in the same unscientific manner, and it has been difficult to turn the attention of the way men and equipment men in the same direction at the same time for a long enough period to study and experiment with various contours and arrive at any definite conclusions.

Referring to the curved-contour rail the statement was made that the change to this was for the purpose of retarding corrugation without any consideration of the effect on the life of the rail. Having realized this improvement in the initial wearing conditions of the rail, it is essential to analyze designs of wheels to forestall any evil effect on the life of rails and wheels caused by the introduction of the curved head.

From the results reported at the 1921 convention, it appears that the term "concave tread" does not convey the proper idea of the contour. The present committee considered the curved tread as meaning a compound fillet connecting the standard 1:25 cone tread and the flange.

The ideal conditions visualized by the committee comprise a design of wheel and rail so that under all normal operating conditions there would be pure rolling motion between wheel and rail. This would reduce the wear on the wheels and rail to a minimum and save power. As a practical matter the conclusion was reached that this subject cannot receive proper attention from general committees having many other subjects in hand and it was suggested that the entire subject of rail-head and wheel contours be assigned to a special committee consisting of equipment men, way men and manufacturers representing industries interested.

Revision of Girder Rail Specifications with Respect to Methods of Test.—The report recommended the substitution of the hardness test for the drop test for girder rails and gave specifications of the hardness test. Briefly, the test consists in subjecting carefully selected and cleaned specimens of rail to pressure from a hardened steel ball ¾ in. in diameter for 15 sec. and measuring the depth of the impression. The revision of standard specifications Wr 2c with respect to the method of testing girder rails by the adoption of the proposed impression test was recommended.

Design of Substitute Ties.—The questionnaire sent out by the committee brought out the fact that of sixty-four companies solicited for information, but twenty-four had used some form of substitute tie. In view of the lack of interest in substitute ties, it was considered that the design of a tie suitable for electric railway use should be given careful consideration, particular attention being paid to the duties required of the tie in this service and its capability of receiving a second or even a third renewal of rail. The possibility of its being used in various forms of track construction should also be studied. The committee considered that the subject is very important and that the study of designs suitable for electric railway use in paved streets should be continued.

Arc Welded Joints.—During the past year the committee gave much attention to this subject and was in close touch with the committee on welded rail joints of the American Bureau of Welding. Interest centered in a proposed machine for testing joints.*

On the subject of the joints themselves, the committee sent out a questionnaire to ascertain the experience of member companies with arc-welded joints and to learn what investigations the manufacturers were making. Results showed that in general users were proceeding upon their own theories, or in accordance with practices which their experience had led them to believe were best.

The principal failures were on rehabilitation work where welds were made on old rail, either with new joint plates or with old joint plates, and the percentage of failures on new work has been small. The principal ways in which joints fail are: (1) By the breaking of the rail at or near the end of the joint plate; (2) failure of the seam weld under the head side of the rail. It is seldom that a joint fails by tensile stress applied in the direction parallel with the rail.

As a result of this study it was recommended that the subject be reassigned to the ensuing committee and its scope enlarged to embrace the investigations of all forms of welded rail joints; that the development of the service test machines be continued; that co-operation with the American Bureau of Welding committee on welded rail joints, be maintained, and that the scientific and technical investigations be done through the agency of the last-named committee.

Wood Preservation.—In view of the completeness of the report of the 1921 committee on way matters and the joint committee on wood preservation, as well as the adoption of certain recommended specifications, it was not thought necessary this year to take any further action except to record advancement in the art or changes in specifications. The only change in specifications recommended was to increase from 5 lb. to 6 lb. the amount of creosote oil per cubic foot to be retained by wood treated by the empty cell process with initial air and final vacuum. Descriptions of creosoting plants of the Boston Elevated Railway and the Georgia Railway & Power Company, prepared respectively by H. M. Steward and C. A. Smith, were appended to the report. In addition supplementary information as to the treatment of ties with sodium fluoride were given, based on the experience of the Baltimore & Ohio Railroad. Satisfactory results with this preservative have been secured, while the same road reported good success with ties treated with water gas tar. Valuable data from the Chicago, Burlington & Quincy Railroad were also included.

Review of Report on Electrolysis of American Committee on Electrolysis.—The committee made no criticism of the report, which was stated to be so comprehensive that no comment is necessary. It was recommended that the subject be assigned to the ensuing committee for purpose of study and investigation of the design of track foundation which will not only answer the requirements as a track foundation but serve also as an insulation to prevent current leakage.

Specifications for Sundry Track Material.—This subject was reported to have been first assigned to the 1915 committee and reassigned in 1916, but nothing further was done until the assignment to the committee in 1921. It was determined that there was a need of specifications for sundry track materials, and electric railway and manufacturer member companies were solicited with a view to obtaining such specifications as they had covering these materials. During the year several tentative specifications for tie rods were submitted for discussion, but no agreement was reached. This item should be taken up by an ensuing committee. However, certain specifications for track bolts, track spikes and tie plates were submitted for adoption. These are identical with the A.S.T.M. specifications, but are rearranged to suit the style of the Engineering Association. The specifications cover the following: Low carbon steel track bolts, quenched alloy steel track bolts, steel track spikes, steel screw spikes, and steel tie plates. The committee gave specifications for all of these in great detail.

Tables of Dimensions of Frogs Used in Tongue and Switch Construction.—

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*See *Electric Railway Journal,* June 17, 1922, page 977.

The committee reported that the recommended specification Ws 1b, layouts for tracks, switches, mates, and frogs, was adopted in 1911 and revised in 1916. This defined four standard frogs, giving angles and lengths. The 1916 revision did not affect this portion of the specifications. The definitions never came into practical use and specifications since adopted conflicted with them. This portion of Ws 1b was therefore withdrawn in 1921. The 1921 convention adopted layouts for standard crossovers and turnouts. The association specifications for special trackwork provide for the length of frog arm by stating that there shall be at least 6½ in. clearance between vertical webs at ends of joint plates. This year's committee, taking the above facts, prepared tables showing frog number, frog angle, toe length, heel length and total length for frogs for girder grooved and girder guard rails, and plain girder and standard section rails. A table was also presented for use where electric street railway construction approximates steam railroad construction, in which case it is highly desirable that the definitions of the A.R.E.A. be followed, especially if the structure of the frogs is to be the same as for steam railroads. This table was based on the standards of the A.R.E.A. for use with standard section rails and for M.C.B. wheels. The committee recommended that the dimensions of frogs for crossovers and turnouts as given in the table to be adopted as "standard design."

Track Construction in Paved Streets.—The committee reported having endeavored to arrange a joint meeting with the corresponding committee of the American Society for Municipal Improvements, but unsuccessfully. The committee, however, sent out early in the year a comprehensive questionnaire on the subject of track construction, and the results of this were compiled and appended to the report.

The replies indicated not only a very wide range of practice, but also wide difference of opinion as to what ideal construction would be. This is due in large measure to local conditions and shows clearly that any specifications should be broad in scope so as to permit wide latitude in selection of material and methods. Belief was expressed that it is desirable to continue co-operative work with the A.S.M.I., even though very little has resulted so far from the effort.

Study of Design of Wheel Treads and Flange Contours as Affecting Way Department—The committee stated that the proper design of wheel treads and flanges is of vital importance to the way department because the wheel treads and flanges wear out the track. The way engineer should have much to say about the kind of wheels that are to be operated on the track for which he is responsible.

For many years way men have tried to standardize track to effect economy and interchangeability. Uniform thickness of wheel flanges therefore seems logical. In favor of the thicker flange preferred by way men, also, is that, on flange bearing special trackwork, the wider the flange the longer the life of the special trackwork.

As to the tread width, the wider tread would carry the weight of equipment through special trackwork without so much punishment to the track as the narrower tread. The wider tread wheels will wear more uniformly than the narrower tread heels and are less apt to cause derailment.

The committee appreciated the importance of adopting standard flanges promptly, but did not believe that it would be wise to adopt any standard without due consideration of the track. It was believed that three different flange contours are all that should be used and that it would handicap the work of future committees to standardize a greater number than that. There has not been enough consideration given to the point of view of the way engineer in the design of wheel contours in the past. The manufacturers and equipment men have introduced changes in flanges and tread contours which materially shorten the life of the track.

Review of Existing Standards and Recommendations Originating with Committee on Way Matters.—The committee suggested a few revisions, particularly with a view to harmonizing the specifications for splice bars for girder and high tee rails of the A.S.T.M. and the Engineering Association. Comparison showed substantial agreement and it was recommended that the Engineering Association specifications be conformed to the others. The same is true with the standard specifications for carbon steel rails of standard sections, as distinct from girder grooved, girder guard and lain girder rails.

This report was signed by W. F. Graves, chairman; H. H. George, vice-chairman; R. C. Cram, sponsor, and C. A. Alden, Victor Angerer, S. Clay Baker, W. R. Dunham, E. B. Entwisle, H. Fort Flowers, C. F. Gailor, J. H. Haylow, E. P. Roundey, F. Tingley and E. M. T. Ryder.

In the following discussion, the subjects assigned to the committee for consideration this year were taken up individually and the discussion was completed on each in turn. On subjects No. 1, 1A, 3, 5 and 12 there was no discussion and the recommendations of the way committee were adopted by the association. Subject No. 2 was discussed by H. Fort Flowers, who said that the way committee favored the use of a compound fillet rather than a curved contour for the tread of wheels. When two wheels differing in diameter by 1/32 in. are mounted on the same axle, if the wheels have a standard taper of one in twenty-five they would have to move endwise ⅜ in. in order to find a point of equal diameter. As there is but ⅛ in. difference between the standard wheel gage and the standard truck gage such unequal-diameter wheels will hug the rail. The report of the committee on this subject of curved wheel and tread contours was accepted with the provision that the recommendation made by the standards committee regarding it be carried out.

Subject No. 3, dealing with girder rail specifications, was discussed by H. H. George, who gave a comparison of the recommendations made by the way committee with existing specifications of the American Society for Testing Materials. Mr. George also explained and elaborated the way committee's report on subject No. 6 relating to wood preservation. The last two recommendations of the way committee in regard to this subject were adopted and the first was adopted with the provision that this subject be assigned to a special committee for consideration.

In discussing subject No. 7, H. A. Johnson reported that the subjects committee had decided that this subject should not be reassigned to the way committee for further study and the recommendation as published in the report of the way committee was withdrawn. This related to the continuation of the preparation of sundry track materials specifications, which will probably be taken up with the A.E.S.C.

The remaining recommendations of the committee were approved. Mr. George explained that Mr. Dunham and he had attended the annual convention of the American Society for Municipal Improvements, at Cleveland, earlier in the week, and that there is good prospect that way engineers will be admitted to active membership in the society. He urged that, if this comes about, as many electric railway engineers as can do so join the society, the annual dues of which are $7.50.

JOINT SESSION WITH WELDING SOCIETY

After the conclusion of the discussion on way matters, Chairman Kimball introduced C. A. McCune, president American Welding Society, who presided over a joint session of the two organizations. This meeting is reported on page 567 of this issue.

Thursday Afternoon

The Thursday afternoon session opened with the presentation of the reports of the committees on power generation and power distribution, which are abstracted below:

POWER GENERATION

The first subject assigned to this committee last fall was a study of the advance in the art of power production, with a view to placing before operating companies specific examples of improvements in design of equipment, methods of operation and economy of performance. It was suggested also that the relative merits of various types and forms of equipment and methods of operation be discussed, with supporting facts and data.

In this report the committee pointed out that this subject is completely covered in the power and light industry by annual reports of the prime movers committee of the National Electric Light Association. A movement is already on foot for co-ordinating the activities of various societies and associations along such lines of investigation. It was suggested, therefore, that work of this character should be organized and conducted along lines similar to those followed by the American Engineering Standards Committee, or the American Committee on Electrolysis, possibly as a sectional committee of the American Engineering Standards Committee. It is recognized that while the functions of such a committee might not be primarily for establishing standard specifications of design and installation for operating methods, its work should be of such nature that the results could be used as a guide in the preparation of such specifications.

In carrying out its assignment of "a study and review of the report on electrolysis issued by the American Committee on Electrolysis," the power generation committee, in co-operation with the committees on power distribution and way matters, prepared and presented a comprehensive analysis of the report. Among other things the committee stated that since much of the data available on the subject has been obtained by studies of situations where trouble has actually occurred, it is perhaps easy to obtain the idea that conditions are bad wherever there is a grounded return railway system. Such, however, is not necessarily the case, and it has been the experience in many places that care in the construction and maintenance of the track, pipe and cable systems has reduced the electrolysis problem to a considerable extent. Such results but further emphasize the desirability of member companies giving the matter careful thought and attention and attaching to the subject the importance it requires.

To have a satisfactory return system requires close co-operation between the distribution and way engineers. Good bonding is essential, which means bonds of ample capacity at each rail joint and cables of adequate size properly installed and connected through special trackwork. One open or high-resistance joint will nullify the effect of many perfectly bonded joints. Periodical bond tests, followed by prompt repairs of defective joints, are necessary to preserve the continuity of the return circuit. The method of bonding is also important. These statements are quoted simply to show the way in which the committee has performed its task. The analysis of the American Committee report on electrolysis also appears in the report of the power distribution committee.

The committee on power generation was assigned, with the committee on power distribution, the broad subject of economics of automatic, semi-automatic and remote-control substations for electric railways. An extended abstract of the result is given in connection with the report of the power distribution committee. On this subject the power generation committee recommended that in future this subject be assigned to a sub-committee on distribution only, as in general interlocking of sub-committee work proves unsatisfactory to those participating and leads to irresponsibility in the preparation of reports.

As to the National Electrical Safety Code, the committee recommended that it be adopted as a guide for working up rules and regulations by member companies and that arrangements be made for representation of the American Electric Railway Engineering Association in future revision of the code.

The final assignment of the committee was the study of standardization of wires and cables in connection with the work being done by the sectional committee of the American Engineering Standards Committee. The committee reported that the work of the American Engineering Standards Committee is still in the organization stage and has been confined so far to organization and rules of procedure and instructions to technical committees. It was recommended that the subject be continued, the appropriate sub-committee keeping in touch with developments and advising with the representative of the Engineering Association on the Standards Committee.

The above report was signed by E. H. Scofield, chairman; W. E. Bryan, H. E. Davis, F. G. Frost, C. A. Greenidge, F. C. Hanker, H. A. Kidder, G. H. Roosevelt, G. W. Saathoff, A. E. Stierly and G. W. Welsh.

POWER DISTRIBUTION

The report of the committee on power distribution reflected the increasing extent to which the Engineering Association is involved in the activity of other organizations in power distribution matters. For example, the overhead wire crossing specifications are tied in with the work of a large number of other interests. These specifications are not satisfactory, and the committee has taken part in deliberations looking toward improvements under the auspices of the American Engineering Standards Committee. Part II of the National Electrical Safety Code, which covers this subject, is under revision, and the committee recommended that the association's "recommended specifications" be suspended.

Another example of the inter-relation of association interests is furnished by the hard-drawn trolley wire specifications. The committee reported the results of co-operation with the appropriate American Society for Testing Materials committee, with a view to harmonizing the specifications of the two associations. The only point for contention is the inclusion of the torsion tests desired by the Engineering Association. As the A.S.T.M. specification is general, the committee felt that it does not make provision for the specific requirements of trolley wire. Progress in securing the desired co-operation was reported, and it was recommended that if if a joint specification can be agreed upon, it should be submitted to the A.E.S.C. for approval as an "American standard." Otherwise, the Engineering Association should submit its specification for round and grooved high conductivity trolley wire for adoption as an "American standard."

The committee reported also the result of a preliminary practical study to determine ultimately the causes of trolley-wire wear. A number of companies were asked to furnish data for actual wear in selected sections, in which it would be practicable to weigh the worn wire. Valuable data were received by the committee, but too late for detailed study. They were, however, included in the report, with the recommendation that the study be continued.

In connection with the harmonizing of differences among various interests concerned in specifications, the following statement by the committee is significant: "The organization and procedure of the American Engineering Standards Committee offer a most excellent opportunity for co-operation between societies and organizations interested in standardization, and should remove the possibility of conflicting or non-uniform standards being adopted by different organizations as has happened too frequently in the past. The power distribution committee believes the American Engineering Standards Committee deserves of the whole-hearted support of this association."

An important topic covered by the committee during the past year was that of the reclamation of deteriorated poles. Good practice was described with reference to the following:

A—Wood poles—(1) Stub reinforcement. This has limited application. (2) Reinforced concrete. Although this is rather expensive, its use may be justified when there are many wires on a pole. (3) Structural steel reinforcing. This is useful in specific cases. (4) Splicing. This can be used only when there is proper guying or close pole spacing.

B—Tubular steel poles—(5) Bolted clamps. These should extend pole life several years. (6) Reinforced concrete. The use of concrete with reinforcing rods or old rail inserted was reported to be giving good results. (7) Pipe sleeve. This is successful but requires removal of fixtures. (8) Drew split sleeve. This can be installed for a fraction of the cost of a new pole. (9) Welded sleeve. This form of sleeve can be applied for about $8.

The automatic substation was one of the subjects assigned to this committee in co-operation with the committee on power generation. The committee reported that the problem which the average operator has before him today is to determine whether or not by the installation of a number of small-sized automatic substations he will be able more efficiently to supply power for the system, when increased business demands additional equipment, than is possible with a few large manual stations. Another problem is to determine whether by rearranging his present converter equipment with automatic control equipment in new stations he will be able to increase the efficiency of distribution to a point where it will be possible by reduction in operating expenses to pay a return on the cost of automatic equipment.

Further, the advent of the small automatic substation put an entirely new light on the question of reserve capacity in transmission lines, converter equipment and feeder systems. With the large manual station, due to the fact that such a station was usually served by a number of high-tension lines and equipped with a number of machines, in the event of the loss of a line or machine it was usually possible by careful operating to "get by" without seriously interfering with the service.

With automatic stations, the loss of a line or machine may mean putting out of service an entire station feeding a definite area, and consideration must be given to this possibility in laying out the system, in determing the number of high-tension lines and machines to a station and also in providing reserve feeder capacity to transfer load to adjacent stations.

The committee gave the results of an analysis of a specific system design for a congested area of a typical city where conditions are such that it is necessary to install 12,000 kw. of converting capacity on account of the abandonment of an old steam generating station, to relieve a number of manual substations which are overloaded and thus to provide for future growth and reserve capacity. Six plans were worked out with the result shown in the accompanying table.

SIX SOLUTIONS OF THE SUBSTATION PROBLEM

	Capital Investment	Annual Charges
Plan 1—12,000-kw. manual station	$593,390	$134,111
Plan 2—Four 3,000-kw. single unit automatic stations....	529,000	93,720
Plan 3—Four 3,000-kw. two-unit automatic stations......	621,000	106,520
Plan 4—Three 4,000-kw. single-unit automatic stations...	500,000	93,780
Plan 5—Three 4,000-kw. two-unit automatic stations.....	563,000	102,480
Plan 6—Six 2,000-kw. single-unit automatic stations......	605,295	97,398

One of the most important points made by the committee on the subject of automatic substations was that relating to the effect of the shutting down of a substation on the feeding area of adjacent stations with consequent increase in distribution losses in it. In one installation this has been overcome by operating the entire distribution system on a graduated voltage scheme, having the stations in the outside area operate at a higher voltage than those in the congested area. As the load drops off the station carrying the lower voltage, the adjacent stations take up the load. A remote-control system superimposed on the automatic control is desirable, as it gives to a dispatcher the means of handling machines and feeders in much the same manner as is done in manual stations.

Another point was as to the distribution of load between units operating on a system. This is accomplished by regulation of voltage, use of drooping characteristics of shunt machines and insertion of load-limiting resistance in the machine circuit.

Finally, feeder protection must provide the following characteristics: The feed must be interrupted if dangerous temperatures are experienced, even though these are caused by concentration of loads resulting from blockades of cars. The feed must be interrupted as nearly instantaneously as possible in the event of short circuit. With these exceptions all useful loads should be sustained with the utmost reliability.

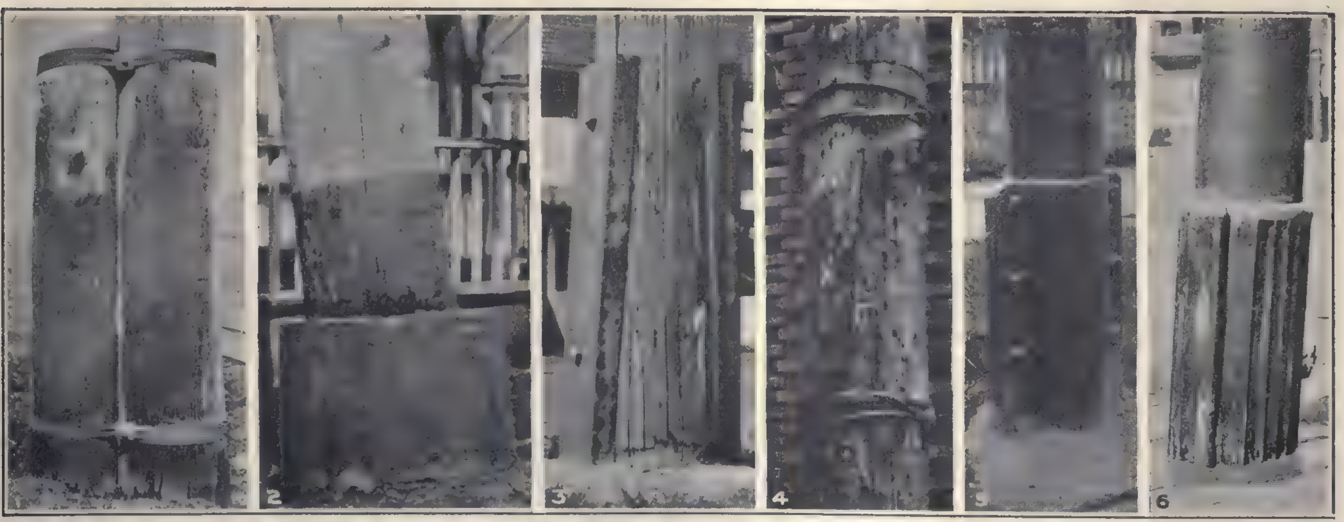
Finally, after an interruption of any kind, the service should be resumed as soon as practicable when safe feeder conditions exist.

The last item in the committee report was a comprehensive statement regarding inductive co-ordination, that is the co-ordination of interests affected by induction from power carrying lines. This subject came up late in the year and was added to the list of assignments at the request of the committee dated April 4, 1922. The committee considered it germane to its work for the following reason: Electric railways are vitally interested in this problem on account of the close proximity of the power and communication circuits of their own and other companies, and the character of the various circuits involved and because in some instances even the direct current distribution circuits have an effect. Furthermore, the communication circuits operated by electric railways for train dispatching and other purposes may be subject to inductive effect on account of their own or foreign supply lines. The report outlined the plan recommended by a joint committee, initiated by the National Electric Light Association and the Bell Telephone System, for the solution of the inductive interference problems.

This report was signed by M. B. Rosevear, chairman; J. R. C. Armstrong, C. C. Beck, H. B. Burd, C. A. Butcher, R. W. Eaton, D. D. Ewing, L. F. Griffith, Charles R. Harte, H. D. Hawks, Adrian Hughes, Jr., Charles H. Jones, F. McVittie, H. S. Murphy, G. Hall Roosevelt and F. J. White.

DISCUSSION ON POWER GENERATION AND DISTRIBUTION

The differences of opinion as to the use of pipe drainage in electrolysis mitigation cropped out in the joint discussion of the reports of the power generation and power distribution committees on this subject. M. B. Rosevear pointed out the experience in New Jersey. The practice has been followed there for a good many years with satisfactory results, but he said his company is willing to go along with the recommended investigation of the subject because the correctness or fallacy of the practice should be brought out by experience. W. E. Bryan, St. Louis, said that thorough interconnection of all pipe and cable systems is carried out there, but only after care-



EXAMPLES OF POLE REINFORCEMENT

No. 1—Stub reinforcement. No. 2—Reinforced concrete. No. 3—Structural steel reinforcing. No. 4—Splicing. No. 5—Bolted clamps. No. 6—Drew split sleeve.

ful consideration and planning on the part of all interested parties. The gas mains are included in this inter-connection. He said there has been no experience to show that fires result from such a practice. Investigation of the subject of joint corrosion feared by many, he said, had not shown any serious results in St. Louis. That pipe drainage has been objectionable from the standpoint of some because of the large values of stray current was the assertion made by H. S. Warren, American Telephone & Telegraph Company, in a written discussion read by K. L. Wilkinson, of the same telephone company, in which he said that pipe drainage or any other method of mitigation should not be undertaken until the economic limit in the proper development of the railway distribution system had been reached. If this development is properly carried out he said that in many cases no further measures would be needed. The statement elicited objection from several sources and Mr. Rosevear detailed a conversation with Mr. Warren over the statement, in which it was made clear that Mr. Warren was laying down in this statement the fundamental engineering principle involved and did not intend to advise that such mitigative measures should be used in already established systems where the cost of following out the ideal treatment would prove an unbearable financial burden. Mr. Rosevear's view was that the problem is one for the railway companies to handle as conditions make necessary in each case. In the general discussion it was the sense of those speaking that a great deal more investigation will be necessary before agreement can be reached on the subject.

Mr. Warren in his letter also pointed out that corrosion in structures is dependent on the conditions of current flow and that apparently large current flow may not produce harmful results due to the surrounding conditions. He also said that voltage measurements alone are wholly inadequate to prove the magnitude or direction of current flow. In commenting on the idea expressed by some that it would be necessary to abandon the ground return system for railway work he said that this is not true, but that careful attention must be given to the potential drops in return systems and the control of stray currents by the proper design of power supply and return systems. The report and recommendations of the power generation committee were accepted as a whole except that the paragraphs referring to electrolysis were referred to the executive committee of the engineering associations. The recommendations of the power distribution committee as to adoption of the national electrical safety code in those parts which affect electric railway construction were accepted with the modification that manual section Ds 1c is to be withdrawn and the recommendation to members is that the safety code be followed as a minimum standard. The discussion of the composition of trolley wire developed a feeling that the torsion test is an essential in determining the wearing qualities of trolley conductors. Charles R. Harte, New Haven, brought out the condition surrounding the manufacture of wire which made a minimum manufacturing cost essential. The American Society for Testing Materials specification does not call for such a test, and the manufacturers, naturally depending on these specifications in most of their work do not use the American Railway Association specification unless required. The absence of such a test fails to reveal the slivering of wire which is the principal cause of quick wear. The situation, he said, is not a criticism of the manufacturers who are doing their utmost to co-operate, but indicates the need of careful inspection of trolley wire to see that the proper specifications are used.

Several written discussions of the automatic sub-station division of the power distribution committee report were handed in but not read, and were not available. In the discussion of inductive co-ordination, A. Schlesinger, Indianapolis, filed a modified code of principle that was submitted for adoption in Indiana and which he thought would be more acceptable. K. L. Wilkinson, of the American Telephone & Telegraph Company, in addition to his commendation of the national electric safety code, expressed pleasure that the American Electric Railway Association was joining in the co-operative study of the subject. A written discussion from W. J. Canada, engineer of the National Electric Light Association, expressed the same sentiment. Prof. D. D. Ewing, of Purdue University, urged close co-operation of all interests for the best good of the public in the final solution of the question. The entire committee report was accepted and approved. V. E. Thelin presented a motion picture of a special design of automatic substation equipment operating in the Chicago district, accompanied by some slides and an explanatory talk.

C. H. Jones, of the committee on economics of electric railway distribution, then presented the report of his committee, which was in the nature of a progress report. It was found that there was great difference of opinion among the committee members and recommendation was therefore made that study of the subject be continued next year. It was also suggested that the executive committee appoint a new committee separate from affiliation with the power generation and power distribution committees. As definite suggestions for the work of the succeeding committee it was recommended that the incoming committee be provided with an outline of the method of study of the subject to be followed. It was also recommended that the new committee study and work out a number of specific examples, comparing costs and merits of different power distribution layouts. The third recommendation was that the new committee endeavor to arrive at a result which will answer the question submitted by the American committee on electrolysis as to the economic limits to which track drop can be reduced.

Under the direction of Martin Schreiber, chairman, the convention then adopted the recommendations of the standards committee with respect to the reports of the way and equipment committees. The recommendations with respect to the power distribution committee could not be adopted as the convention had made recommendations with respect to the standard safety code, part two, which made necessary reconsideration of the matter by the standard committee in view of some confusion as to action taken on various matters in the convention, Mr. Datz made a motion which was carried that if any conflicts had been made in adopting standards committee recommendations that these matters should be automatically referred back to the standards committee.

The report of the committee on purchase and stores was received by title. An abstract follows:

PURCHASES AND STORES

The subject assigned to this committee was a study of proper methods for taking periodical inventories with a view to adopting standard forms. The committee found that the subject was rather complex and included accounting features. It was felt therefore, that it should be continued in collaboration with the committee on stores accounting of the Accountants' Association.

In regard to the inventory, the committee recommended that this should be taken on a date set by a proper official before the ending of the fiscal year, sufficiently in advance to allow for the compilation of the data before the company's books are closed for the year.

A definite method should be prepared and sent to all employees having to do with the taking of complete inventory of materials on hand, under the jurisdiction of the stores department.

The physical taking of inventory, together with the pricing and extending of same, should be done by the stores department forces under the direct supervision of the auditing department, unless the latter is keeping the stock and price records, in which case it should do the pricing and extending.

In the preparation for the inventory-taking, a card or other form should be provided for the record of the quantity of each item of material on hand, and the date this is counted, with spaces to show what is received and issued from that date until the date of closing for the fiscal year. This card is to be kept in the bins and the entries made thereon by the force handling the receipt and issuance of material, or else in the storeroom office and the entries made from the receiving and issuing records, after which these cards, or other form, should be assembled and computed to show the quantity of each item on hand the end of fiscal year.

After the quantities of all items on hand have been ascertained as shown on the inventory cards, or other form, the entries should be transferred to a form provided for the purpose, listed and classified thereon, and prices and extensions verified to arrive at the grand total as of the end of the fiscal year.

All material received and included in the inventory for which invoices have not been taken into stock account should be listed and treated as a deduction from the inventory. Likewise, all material not received, but for which invoices for discount purposes have been taken into stock account, should be listed and treated as an addition to inventory, both to apply as of the date the inventory is effective.

The committee presented as exhibits inventory stock cards and forms from the Interborough Rapid Transit Company, the Capital Traction Company and the Public Service Railway.

The report was signed by W. H. Staub, chairman; William C. Bell, J. F. Fleming, C. A. Harris, J. R. McGivney, W. G. Simonds and W. S. Stackpole.

H. A. Johnson then presented the report of the resolutions committee thanking the officers and special engineer Hecker for their good work, expressing appreciation to the manufacturers for the exhibits and recommending to the executive committee that the sponsor system be continued and that it gives consideration to the recommendations regarding reorganization. Mr. Datz presented a resolution of regret on the death of former third vice-president Arthur B. Stitzer.

The report of the nominating committee was then presented and Secretary Hecker was instructed to cast the unanimous ballot of the association for the following officers: President, L. C. Datz, chief engineer Little Rock Railway & Electric Company, Little Rock, Ark.; First Vice-President H. A. Johnson, assistant general manager Chicago Elevated Railroads; Second Vice-President Charles H. Clark, engineer maintenance of way Cleveland Railway; Third Vice-President R. C. Cram, engineer of surface roadway Brooklyn Rapid Transit Company. The members of the executive committee are Charles R. Harte, Daniel Durie, R. H. Dalgleish and E. H. Scofield.

STANDARDS

While the report of the committee on standards was given piecemeal throughout the meeting the following abstract will serve to give a general view of the work of this committee:

The committee on standards reported the recommendations made at the meeting of Sept. 7 and the items in the report of the several committees that required such recommendations. The actions in substance were as follows:

The typical layout plans of shops prepared by the committee on buildings and structures were approved as "miscellaneous methods and practices," with the recommendation that they be published in the Engineering Manual. The suggestion of the buildings and structures committee that certain material contained in its report be considered as embodying good current practice in the design and construction of small bridges, culverts and trestles, was referred back to the committee with the request that the committee's recommendation be put in standard form.

The committee on power distribution, having recommended that the Manual specification Ds 1c be withdrawn, due to the pending revision of the wire crossing specifications of the National Electrical Safety Code, the standards committee approved this recommendation. The same action was taken with respect to the removal of section Df 1a, relating to clinch ears for round trolley wire, which has been superseded by Par. 405 of Sec. Df 4c, of the specification for overhead line material.

A number of detailed actions were taken with respect to the report of the committee on way matters, the first being the approval as "recommended design" of tables and drawings covering car clearance easements, submitted by the 1921 committee and subsequently revised. Further, the adoption as "standard design" of the diagram submitted showing the location of tongue switches in crossovers and turnouts, was approved. The same action was taken with the recommendation that the drop test be replaced by the impression test in the rail specification, Wr 2c, and Clause 16 Sec. 5 of this specification was changed to read: "The ends (of the rail) shall be milled square laterally; they should be undercut vertically not less than $\frac{1}{32}$ in. and not more than $\frac{3}{32}$ in." In the recommended specification for creosote oil, Sec. Wm 82, an increase in the amount of oil retained from 5 lb. to 6 lb. per cubic foot was approved. Six specifications for track bolts, track spikes and tie plates were approved for adoption as "recommended specifications." In order to conform the association specifications for steel splice bars to the A. S. T. M. specifications, the committee recommended that Manual section Wm 3a be withdrawn and that the A. S. T. M. specification for low carbon, extra high carbon, medium carbon and high carbon steel splice bars be arranged in standard association form and adopted. The recommendation of the way committee regarding a standard specification for carbon steel rails, intended to cover the manufacture of steel rails in standard sections as distinct from girder grooved, girder guard and plain girder rails, was approved.

SPECIAL COMMITTEE ON WHEEL AND RAIL CONTOUR

The standards committee considered proposals from the equipment committee regarding tread and flange contours for chilled and rolled steel wheels, recommended for adoption as standard. The conclusion was to recommend to the incoming Engineering Association executive committee that a special committee consisting of representatives of the equipment and way committees, and of manufacturers of wheels, rails and special trackwork, be appointed to study wheel and rail contours. The standards committee approved the recommendations of the equipment committee that certain changes be made in Manual Sec. Ec 1b, relating to dimensions of cars, etc., placing the height of platform for interurban cars from top of rails and top of platform at 51 in. and the height of bumpers at 43 in.; further, that where possible provision be made to prevent telescoping in case of collision between city and interurban cars, and that the bumper casting on city cars be designed to include a pocket casting to permit the coupling of city cars to interurban cars by means of a suitable bar. Approval was also given to recommendation of the equipment committee as to certain details of design of axles, E2 to E10 inclusive, with the corresponding changes in bearings; further, that the present standard E1 axle be eliminated and that E2 be used instead. A new axle, E12, was approved for use where E2 is not available. The same action was taken with respect to the withdrawal of the present specification for cold-rolled steel axle, a new specification for open-hearth, hammered steel axles be adopted.

This report was signed by Martin Schreiber, chairman; H. L. Andrews, E. J. Blair, J. A. Brooks, C. H. Clark, L. P. Crecelius, E. R. Hill, C. G. Keen, John Lindall, G. R. Lyman, H. H. Norris, F. R. Phillips, N. W. Storer and N. B. Trist.

Exhibits and Entertainments

THE exhibits were shown on the Municipal Pier and occupied more than 60,000 sq.ft. of space. An attractive entertainment for the delegates was provided, including a reception Monday night, a dinner followed by a playlet on traction conditions by John E. Wilkie Wednesday night and a ball Thursday night, with automobile trips and other pastime for the ladies. The attendance was about 4,200.

The *Electric Railway Journal* published a daily issue on the mornings of Tuesday, Wednesday and Thursday with accounts of the exhibits and entertainment features and a short running account of each session. These three issues had a total of 52 reading pages.

Accountants' and Claims' Elections

A REPORT of the proceedings of the Accountants' Association convention will appear in the issue of this paper for Oct. 14, and one of the proceedings of the Claims Association meeting in the issue for Oct. 21.

At the final meeting of the Accountants' Association, held Oct. 5, W. G. Nicholson, secretary Omaha & Council Bluffs Street Railway, Omaha, Neb., was elected president. On the same day the Claims Association elected as president Wallace Muir, claim agent Kentucky Traction & Terminal Company, Lexington, Ky.

American Association News

Recommendations for Subjects American Association for 1922-1923

The 1921-1922 committee on subjects and meetings of the American Association held a meeting on Monday, Oct. 2, at the Drake Hotel, Chicago, for the purpose of forming recommendations as to subjects for consideration for 1922-1923, in accordance with by-law IX of the Constitution and By-Laws. An abstract of the report follows:

We recommend for major study and discussion by the association during the ensuing year, two general subjects:

A—The upbuilding and further restoration of street railway credit.

B—Study of the trackless transportation, particularly buses and automobiles, in relation to electric railways.

Under the first topic, these headings are suggested:

1. Flexible systems of fares.
2. Relief from paving, special taxation and other unreasonable and inequitable burdens.
3. Education on valuation problems, so that valuation procedure may be simplified and standardized.
4. The use of simple indeterminate franchises subject to commission control, if operation is now under short-term franchises.
5. Certificates of convenience and necessity from regulatory bodies for additions to present transportation facilities.
6. The unification of all local transportation under one agency.

We have studied the work of the committees that were appointed the past year and feel a continuance of the work by these same committees, as previously outlined, is desirable.

We have no further suggestions other than to call the attention of committees to the necessity for being a little more diligent. In several instances, the committees have held no meetings and other committees have held only one. We feel this is an unfortunate situation, and if a committee is appointed to study a subject it should hold more than one meeting in order properly to do its work.

In addition to the standing and continuing committees, we have in mind for the continuance of work next year, committees listed as follows: Co-operation with manufacturers, valuation, electrolysis, mail pay, education, uniform motor vehicle law, trackless transportation, maintenance and construction of highways.

Concerning the question of subjects for the four affiliated associations, the Engineering Association and the Transportation & Traffic Association have committees on subjects which are making complete recommendations for next year's program for these two associations, and we presume that these subjects will be referred in due course to the policy committee in accordance with By-Law VII.

In connection with the Accountants' Association, we call attention to the value of budget control and recommend this for study by that association. It is suggested that the work of the committee on relations with other accounting associations be enlarged, and that it continue work on the standard classification of accounts and on the study of engineering accounting.

For the Claims' Association, we feel that accident prevention should receive continued emphasis and further study, suggest also a study of Hooper-Holmes and local city bureaus, which exist in a number of larger cities, to increase their efficiency and broaden their scope, to the end that fraudulent accident claims may be reduced to a minimum.

Special Reports and Compilations

THE following tangible results of the work of the Bureau of Information and Service are now available to member companies in good standing upon request:

Public Utility Laws — A summary of the laws creating the state public utility commissions, giving an analytical digest of the main provisions covering their jurisdiction and powers over transportation companies. This is the fourth installment of this compilation, which was begun in June.

Analysis of Labor Agreements — An analytical digest of the provisions appearing in the labor contracts of twelve large city companies, arranged in such a way as to make possible a ready comparison of working conditions.

Rate of Return—Extracts from public service commission decisions fixing proper rates of return for street railways. This compilation is similar to the one issued on Feb. 1, 1921, and gives decisions occurring since that date.

Railway Automatic Substations — A tabulation of the automatic equipments sold or installed, classified as to type of service. It brings down to date the tabulation shown in the 1921 report of the committee on power generation and shows for each installation the substation rating, the number of machines, the date of installation or date and type of equipment (whether control only or entire converting equipment).

Cities in Which Fares Have Been Changed—This is a complete new edition of the regular association fare bulletin and shows the city, the population, the name of the operating company, the cash fare and ticket rate, the date of the last fare change and the number of changes granted to Sept. 1, 1922.

Reclamation of Trolley Poles—Summary of the replies of seven companies to questionnaire on causes of wear, method of reclamation and results obtained.

In addition to the above, supplements to the wage bulletin and cost-of-living studies have been prepared, bringing them down to date.

News from Other Associations

Startling Statistics on Public Accidents*

Seventy-six thousand accidental deaths—a life needlessly snuffed out every six minutes—is the astounding bill charged against careless America during 1920, according to the report of the public accident statistics committee of the National Safety Council.

While the 1920 toll from all public and industrial accidents, representing the total population of the State of Nevada, is a decrease of 3,300 over 1911, there is only a balance of 400 on the credit side of the ledger over the 1919 total. Automobile accidents are held to be in part responsible for the unfavorable experience of 1920; in that year there were 1,200 more deaths from that cause than occurred in 1919. The chief reason for this, it is pointed out, was the large increase in the number of automobile users. The automobile fatality frequency for 1920 was thirty deaths a day, a total for the year of 11,000. The 1921 estimate of automobile deaths, based on figures now available from fifty of the largest cities, indicates a considerable increase over 1920. General traffic accidents in 1921, however, will show a 5 per cent decrease over 1920, it is believed.

People died from falling accidents of all kinds at the rate of thirty-four a day, a higher rate than even automobiles. Burns claimed twenty-two lives a day, a total for the year of 8,088 and an increase of 215 over 1919. Other major causes of accidental deaths are listed in order of importance as follows: Railroad accidents, 7,769; drownings, 6,066; deaths from gassing 3,618; firearms, 2,767; mine accidents, 2,660; machinery, 2,660; street cars, 2,128; other vehicles, 2,022; conflagrations, 1,277. Other general causes of deaths are crushing accidents, poisonings, sharp instruments, excessive heat or cold, injuries by animals, lightning and electricity.

The burden of accident mortality continues to fall chiefly upon children and upon the active working classes, according to the report, which is the result of exhaustive research and statistical work on the part of the committee, which is composed of Louis I. Dublin, chief statistician of the Metropolitan Life Insurance Company, chairman; Herbert P. Stellwagen, National Bureau of Casualty and Surety Underwriters,

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*Abstract of committee report presented at Eleventh Annual Safety Congress, Detroit, Mich., Aug. 28-Sept. 1.

A. W. Koehler, New York Electric Railways, and E. W. Kopf.

Fatal accidents to children under five years number 9,880, or 13 per cent of the total. Young people from fifteen to twenty-four bore 14 per cent of the burden; those from twenty-five to thirty-four, 13 per cent; thirty-five to forty-four, 12 per cent, and those from forty-five to fifty-four, 10 per cent of all the accidental deaths of the year. A majority of the children came to their deaths through fatal burns, deleterious gases and automobile accidents. One-third of all automobile deaths occur among children under fifteen years.

Accidents in industry show a general decline of 1.3 deaths per 100,000 population for each year of the ten-year period, while public accidents decreased 1.1 per 100,000. The 1920 report shows public accidents on a slight upward turn, while industrial accidents declined; this in spite of increased manufacturing activities. Total industrial fatalities in 1920 were set at 12,500. The 1921 total, so far as can be anticipated from figures collected from insurance companies and other agencies, will probably be still lower because of reduced employment.

Chief causes of industrial fatalities during the period from 1912 to 1920, as shown by figures collected by the industrial department of the Metropolitan Life Insurance Company, are railroad accidents, falls of persons, machinery accidents, mines and quarries, electricity, drownings, street cars, automobile accidents, burns, and gasings, listed in order of importance.

Railroad accidents, both public and industrial, showed no decline, as there were 7,769 such deaths; some progress has been made, however, as past records show a total of 12,178 railroad deaths in 1911.

Present and Future of Berlin Street Railways*

Since the City Took Over the Properties, It Has Standardized on Certain Equipment—Changes in Fares and Nature of Traffic Since the War Are Described

BY DR. L. ADLER

Manager Municipal Tramway System, Berlin, Germany

IN OCTOBER, 1920, the city of Berlin took over the seven existing street railway companies in that city and consolidated them to make one big municipal system, known as the Berliner Strassenbahnen. This new system serves an area more than 45 km. (28 miles) in diameter, and with a trackage of more than 1,250 km. (840 miles), or about the distance from Berlin to Rome.

Many complications of a financial and technical nature resulted from this merger. The capital liabilities of these companies had to be cared for and funds for rehabilitation provided, but it is believed that there will be corresponding gains by the economies made possible through this consolidation. For example, the number of employees is now 3,000 less than in the last year of separate operation, although the number of passengers carried has not decreased.

Steps are being taken also toward standardizing equipment, an important matter in view of the fact that more than thirty different types of motors, cars, brakes, etc., must now be kept up. This difficulty was partly overcome by using only certain types of equipment on all cars operating out of individual carhouses. Regular inspection of cars every two weeks also helps materially to keep down maintenance.

All the older cars were equipped with 20 to 25-hp. motors, which are too small for the present conditions. Only the new cars are adequately equipped with motors of 50 hp. The older types of motors are therefore used now only on lines where the traffic is light, and some have been improved by the addition of openings for ventilation in the closed motor casings. In some cases ball or roller bearings have replaced the previous simple bushing bearings. In other cases a high-grade anti-friction alloy was substituted for the old bearing metal. Greater care in the selection and training of motormen has also helped to reduce the motor repair bill. With all these methods, a surprising reduction of the number of motor failures has been realized. During 1920 there was a monthly average of 561 armature repairs, but this figure fell to 80 during 1921. The result was a monthly saving of more than 2,500,000 marks.

Up to the time of the merger, there were in use the wheel trolley, the bow trolley and the underground conduit system. The latter system was entirely abandoned, because its upkeep was high and its performance was unreliable in snow and rainstorms. Carefully compiled figures, comparing the results of the wheel and bow types of trolley, showed that if properly installed their maintenance costs are about equal. The bow type seems to be more reliable and is being used now on all new lines built in Germany. In Berlin, however, it was decided, for reasons of economy, to standardize on the wheel trolley because the overhead equipment already erected in Berlin for this system was four times that which had been erected for the bow type of trolley.

Two main types of brakes had been in use on the system, namely, electric and pneumatic braking. The safety of operation is the same in either case, but the air brake has many disadvantages. If the compressor is axle driven, its wear and tear and the cost of lubrication are exceedingly high. If it is motor driven, the cost is also high and the maintenance is considerable. It was therefore decided to abandon the air brakes and to standardize on the electric brake with seven braking steps on the controller. Only for suburban lines with one or more trailers to each motor car will the air-brake system be used.

There are now in use 1,400 four-wheel cars and 1,000 eight-wheel cars. The latter ride more comfortably, but the former require 30 to 40 per cent less maintenance cost and also are better from a tractive point of view because all axles are driven. For urban lines the four-wheel car is no doubt preferable, but the old cars of this design, with their original wheelbase of 1.8 m. (5 ft.), are now being gradually rebuilt to have a wheelbase of 2.4 m. (7 ft. 10 in.). A four-wheel car, with electric brake and sufficiently wide doors, is the most desirable type.

During the war, when traffic was heavy and no repairs were made, the rails became badly worn, and it will require much labor and expense to renew them. All new tracks will be laid in stone paving, as the use of asphalt is now far too expensive. Present track rehabilitation consists principally in cutting off the worn ends of the rails and connecting together the remaining four-fifths lengths by gas or electric welding. For joints in new rail the thermit process is generally used.

During 1920, the Berlin transportation systems carried 1,455,000,000 passengers, divided as follows: 54.3 per cent on the surface cars, 38.4 per cent on the steam-operated Stadtbahn, 6.9 per cent on the rapid transit lines and 0.4 per cent on the buses. In 1921 these figures changed to: 48 per cent on surface cars, 43 per cent on the Stadtbahn, 7 per cent on the rapid transit lines and 2 per cent on the buses.

Characteristic features of Berlin traffic are: In summer the traffic on the Stadtbahn and the rapid transit lines decreases, as the people prefer to travel on the open street cars and buses. The opposite is the case in winter, due to well-heated cars on the heavier traction lines. There is little travel on Sundays, which is in great contrast to pre-war days, when far more people spent their Sundays in the suburbs. The best traffic days now are Saturdays and Mondays. Very careful statistics are being kept to determine the proper schedule requirements of the different lines.

The actual cost of operation per car-kilometer amounted in 1921 to 7.5 marks, and many lines showed receipts far below that figure. Some lines have been rerouted, other badly paying lines were combined with lines of better revenue and all schedules have been redrafted. Unfortunately, the needs of traffic and economy are frequently in opposition. The former calls for a short headway of cars with a large ratio of seats to passengers. The latter requires full or even overfilled cars to compensate for the present high costs of operation. The present problem is to find a proper compromise between traffic and economy, and until a decided betterment of the present economical situation occurs, it is impracticable to pay much more attention to the requirements of the traffic.

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*Abstract of paper read at a meeting of the Deutsche Maschinentechnischen Gesellschaft, Berlin, Feb. 21, 1922.

Recent Happenings in Great Britain

British Tramway Wages Again a Problem—Power Supply Being Planned for Electrified Railways—250 New Cars to Be Bought for London Electric Railways

(From our British News Representative)

LABOR trouble threatens in the British tramway world. The employers gave notice that on Sept. 21 it was proposed to terminate the existing sliding scale agreement under which wages vary in accordance with fluctuations in the index figure of the cost of living. They also announced that it was intended to reduce wages by 12s. a week by three installments of 4s. each spread over September, October and November. The employees' side of the National Joint Council for the industry rejected the proposal. The employers advanced as a reason for the reduction the fact that the tramway men's wages are higher than those paid in some of the chief industries of the country, though many of the tramways are working at a loss, and that there is a great public demand for a return to pre-war fares. The trade unions concerned organized to resist the proposed reduction.

Power Stations for Electrified Railways

An interesting indication as to how matters will go in the future in regard to the provision of power stations for railways to be electrified is contained in a statement issued by the Electricity Commissioners regarding application by the South Eastern & Chatham Railway for their consent, under Sec. 11 of the electricity (supply) act of 1919, to the establishment of a generating station at Charlton, Kent. The purpose of this station is to provide energy for working the company's suburban lines. As already announced, these are to be electrified. The West Kent Electric Company also asked for sanction to erect a power station at Erith, Kent. The commissioners held an inquiry and in the course of it offers to supply the railway with the energy required were made by one West Kent Company and by the County of London Electric Supply Company.

Section 11 of the act of 1919 provides that it shall not be lawful for any authority, company, or person to establish a new plant or extend an existing generating station without the consent of the Electricity Commissioners. It also provides that in the case of a railway using or proposing to use electricity for traction consent shall not be refused unless it is proved that a joint electricity authority or authorized undertakers are willing and in a position to give the railway a supply of electricity adequate in quantity and regularity to meet the present and prospective demands of the railway at a cost not greater than would have been incurred by the railway in supplying itself.

The Electricity Commissioners, having examined the schemes of the West Kent Company and the County of London Company, found that there were authorized undertakers willing to supply power to the railway and be in a position to do so when the electrification of the lines would be complete. There would be a substantial saving in capital expenditure and no disadvantage to the railway to take the supply from an outside source. The railway was prepared to consider doing so subject to satisfactory guarantees. The commissioners were strongly of the view that the railway ought to enter into negotiations with the authorized undertakers and discuss the actual terms of a firm contract. Pending that, the commissioners postponed their decision.

New Rolling Stock for London Line

The London Electric Railway, in order to meet extensions and increasing traffic, proposes to acquire 250 new cars. As a preliminary, five of the leading British rolling stock manufacturers have been invited to prepare designs in accordance with an outline specification and to construct demonstration vehicles. The sample cars will be trailers, but corresponding characteristics will be applicable to the motor cars when the orders come to be awarded. Double pairs of sliding doors on each side are preferred by the railway, end doors being dispensed with. Another important point is the reduction of noise. Experiments have already shown that comparative silence can be attained by filling the hollow roof of an existing car with asbestos, fitting the windows with central struts, and putting a kind of hood over the wheels.

The members of a municipal deputation from Chicago, who have been visiting a number of cities on the continent of Europe, were in London during August. One of them, Aldermen Toman, stated that London had the best method of handling the traveling public that he had ever seen. Mr. Toman also said that one result of his tour was to confirm his strong opposition to the municipal ownership of Chicago tramways. He will advocate "tube" railways for his city.

High-Speed Locomotive

The Metropolitan-Vickers Electrical Company has delivered to the North Eastern Railway an experimental high-speed electric locomotive. Its maximum speed is 90 m.p.h. The machine is intended to be able to haul a 450-ton train at more than 60 miles an hour for long distances. The ultimate aim, of course, is the use of such locomotives for express passenger trains (such as the "Flying Scotchman") on the main line between York and Newcastle.

American managers who are interested in the question of the effect of the number of stopping places on average car speed may be interested in some facts given by J. K. Bruce, traffic manager of the London County Council Tramways, as regards experience on the system. The figures must be read in light of the fact that nearly all the cars are double-deckers and that in regard to most of them they seat nearly eighty passengers each. In general there are about eight stopping places per mile, of which two are compulsory and six by request. The average length of stay at a request stop is seven seconds, so that, assuming the stops are made at every "by request" stopping place, the total stop time excluding main traffic points over a 7-mile route is less than five minutes. Observation shows that the total stop time for a journey of this distance is between three and four minutes, as even at rush hours few optional stops are made. The average car speed on the London County Council Tramways is much higher than on any other city tramway in Britain, notwithstanding the great density of the traffic.

It is proposed by the Manchester Tramways Committee that J. M. McElroy, late general manager of Manchester Tramways, shall be retained for five years at an annual fee of 150 guineas to act in an advisory capacity in connection with parliamentary, arbitration and local inquiry proceedings and other matters relating to passenger transport in Manchester and district.

Some time ago I reported the negotiations were in progress for the purchase of the Paisley Tramway Company's undertaking by Glasgow Town Council. There has been much talk, but at a meeting of the Council held some weeks ago, it was decided to offer the company £250,000 for the undertaking. A minority of the Corporation contended that Glasgow should have nothing to do with the project. The capital expenditure of the company has been over £400,000.

Edinburgh Project Opened

The first electrified section of Edinburgh Corporation Tramways was formally opened on June 20. It is a north and south line from Pilrig to Liberton, a distance of about 3 miles, and it passes through the center of the city. The other routes will be converted from the cable system as speedily as possible, and it is hoped that the work will be completed about the end of next year.

An example of the fall in the price of steel is quoted from Rotherham. The tramway committee there placed an order last year with a Sheffield firm for 400 tons of rails, half to be delivered in 1921 and half in the current year. The price of the first lot was £25 15s. per ton and of the second lot only £12 10s. per ton.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Files Damage Claim

International Railway Alleges City Failed to Furnish Adequate Protection—Representatives Ready for Negotiations

The International Railway, Buffalo, has filed with the city law department a claim for damages aggregating $3,805,250, which, it is alleged, was incurred during the strike which started July 1, through the failure of the city to furnish adequate protection to its property and employees. Of this amount, an item of $4,250 is for actual property damage. The International alleges that in addition to this damage it has sustained a loss of $1,800,000 in operating revenue and $2,000,000 in loss of good will.

Herbert G. Tulley, president of the International, in a statement accompanying the filing of the claim, states that the company used reasonable diligence in trying to prevent its property from being damaged but did not get adequate protection from the city. He says that on July 2, the second day of the strike, Mayor Frank X. Schwab was notified that threats of violence against the company had been made and he was notified that the property of the International had been damaged. It is also alleged that the Mayor and chief of police had knowledge and information from various sources of threats to damage the property of the company.

From July 2 to Sept. 30, Mr. Tulley says there have been mobs and assemblages of riotous and disorderly persons who have interfered with the business of the International and injured its property by riotous acts. It is claimed these mobs used force and violence and made threats to officers, employees and passengers of the company, have attacked crews, stoned cars, exploded dynamite, derailed cars and committed other acts that have injured property and caused a loss of income.

Immediately after the filing of the claim with the city law department, President Tulley sent a letter to Mayor Schwab saying:

> The claim of International Railway Company for losses specified therein has been filed in accordance with the law.
>
> In order to prevent any misunderstanding, I wish to state that the company in taking this step, does not wish to be understood in any way to change its policy of co-operation with the city, as evidenced in our recent correspondence, and also in my letter nominating the company's confreres.

The International Railway has nominated two of the three men who will represent it in negotiations with a committee of three members of the City Council with a view to the adoption of a plan whereby the 5-cent fare may be re-established in Buffalo. The company now charges 7 cents or four tokens for 25 cents. The company's representatives will be President Tulley, Vice-President Edgar J. Dickson and a Philadelphia official representing Mitten Management, Inc., which operates the local and interurban lines of the International Railway system. The city's representatives on the committee will be Mayor Schwab, Councilman Ross Graves and Councilman Arthur W. Kreinheder.

No Disorders From Withdrawal of Emergency Pay

No strike or other disorder resulted when the International withdrew its emergency wages of $7.50 per day to employees who have been operating the cars since the strike was called. Efforts were made by strikers and their sympathizers to create discontent among the loyal employees and have them strike when the company discontinued its emergency wages and established the regular wage scale of 55 cents an hour. A few employees resigned but their places were quickly filled and the International now has a complete new operating staff working at regular wages. The camps where trainmen are boarded and fed, if the men so desire, are being continued temporarily.

Commenting editorially upon the damage claim filed with the city law department by the International, the Buffalo *Commercial*, open shop daily newspaper which has been supporting the railway in its effort to overthrow union domination, said:

> It will be a sorry day for Mayor Schwab and the City Council if the claims of the International are sustained. The taxpayers are groaning under heavy burdens as it is. If the courts hold that the claims of the street car company are valid against the city, even in part, there will be such an uprising at the next election as was never seen in Buffalo, for we all know how deliberately and wantonly the city government failed to give that protection to life, property and individual and corporate rights that is one of its most important functions. The courts have everywhere held that the neglect of a municipality to protect its citizens makes itself liable for the amount of the injury inflicted, assuming, of course, that the citizens themselves used diligence in trying to protect their own interests.

Additional arrests are being made daily by employees of the International of jitney drivers who are defying the orders of the courts and the laws of the state and city. Sentences of $250 fines and thirty days in the penitentiary have been imposed upon many jitney drivers while others have escaped with $50 fines. International employees continue to serve injunctions restraining jitney drivers from operating unlawfully within the city and no apparent effort is made by the police to stop this illegal operation.

Normal service continues to be given in Buffalo and Niagara Falls and over all interurban lines but local service has not yet been started in the city of Lockport.

Seeks Franchise to Haul Freight—Increased Revenue May Meet Paving Expenses

Efforts are being made by the San José Railroads operating in San José and Santa Clara, Calif., to obtain a franchise over its electric line on North Seventeenth Street, San José, which would enable it to haul freight in carload lots between the hours of 6 a.m. and 9 p.m. The railroad company is confronted with paving its 22-ft. franchise right of way on the unpaved portion of North Seventeenth Street, which involves an expenditure of approximately $100,000. In view of this expenditure the San José Railroads is endeavoring to obtain more revenue out of the line in question by being able to conduct carload freight business over it.

The San José Railroads has spent more than $600,000 in paving expenses, which has not added to the company's revenue, but has given it competition with the jitneys. The company does not want to make further abandonments, but cannot obtain any more revenue for paving purposes.

	Six Months Ended June 30, 1922	Six Months Ended June 30, 1921
Way and structures	$15,859	$19,953
Equipment	15,160	15,796
Power	19,828	19,788
Conducting transportation	72,354	84,313
Traffic	1,207	1,347
General and miscellaneous	19,342	14,809
Trans. for investment	530*	......
Total	$143,221	$156,007
Depreciation	3,152	3,086
Taxes	13,206	11,649
Total—Depreciation and taxes	16,358	14,735
Grand total—Expenses	$159,580	$170,743
Operating revenues	$206,426	$198,572
Car mileage	944,221	881,897

* Credit.

Recently the situation was presented in considerable detail to the City Council by the San José Railroads and a request was made for a franchise granting the San José Railroads permission to carry freight in the territory described and under such rules as to the time of service, etc., as the City Council should deem best.

Some opposition developed, culminating in a petition signed by some of the property owners living in Seventeenth Street requesting the City Council to refuse the application. In consequence a public hearing on the matter was called recently.

In a recent statement to the public the company claimed that despite economical management the property did not earn a reasonable return.

The accompanying table shows a comparison of expenses for the six months ended June 30, 1922, and June 30, 1921.

Three Proposals for Detroit Voters

$5,000,000 Bond Issue for Extensions for Municipal Lines, Detroit United Ouster and Paving Charge Transfer Up for Consideration on Nov. 7 —City Refuses to Sign Agreement with Union

In view of the contemplated extension of the city lines, the Detroit City Council has authorized the submission of the proposition for issuing $5,000,000 in public utility bonds to the voters at the Nov. 7 election. In unfolding the plans of the Department of Street Railways, the Mayor stated that the Department of Street Railways was working out a program for extensions which will be presented to the Council early next year.

RAILWAY DEPARTMENT IN GOOD SHAPE

An authorized bond issue on which to borrow money will be needed if it is necessary to borrow for the extension work. Temporary notes backed by a bond issue may also be needed to pay for the 200 Peter Witt cars ordered by the city, the Mayor pointed out. He further explained that none of the money resulting from the bond issue could be used for development without the approval of the Council.

The Department of Street Railways is in excellent condition, the Mayor stated, cash on hand from earnings being sufficient to meet operating and maintenance costs, also to meet interest and principal on the original purchase in addition to providing a sinking fund. It should not, however, be expected to be prepared to meet cost of much-needed extensions. The proposal for a bond issue is, in the Mayor's opinion, similar to the action of any corporation preparatory to making extensions or expanding its business, issuing additional securities. Where the private corporation must go to the state for permission, the Department of Street Railways goes to the people.

In requesting authority to submit the question to the electors the Mayor accompanied his communication by a resolution passed by the Street Railway Commission giving the needs of the department. It is anticipated that the commission will be able to borrow temporary funds on the authorization of the bonds and possibly avoid issuing any bonds to pay for the cars.

TRACK USAGE

Another question to be voted on at the Nov. 7 election is the one of ousting the Detroit United Railway interurban cars from the city streets. The wording will be: "Do you favor terminating the permission to the Detroit United Railway to operate its interurban service within the city of Detroit, said service to terminate on and after Dec. 31, 1924?" The Mayor cited that in the two years and more before the order will take effect plans will be worked out whereby service to the public will be greatly improved. Although notice has already been served on the Detroit United Railway calling for termination of the use of the city trackage, the Mayor believes that the matter is one in which the people should be consulted.

One clause in the city's purchase contract provides that two years' notice must be given the company. It has been cited that the approval of the action will necessitate the erection of car houses and terminals at the city limits connecting with the municipal railway lines within the city.

Of plans that occur to him, the Mayor stated that the extension of Detroit's street railway system to cover all of the suburbs might completely solve the problem. Under the law the city has the right to extend service 10 miles from the city limits, which would include all of the territory referred to.

RELIEF FROM PAVING CHARGES

The policy of forming a big metropolitan district is mentioned as not only simplifying the transportation question but that of gas, water, light and all of the services performed by a local government for its people. The Mayor believes that it would be better for all, including Detroit and its suburban neighbors, to get together for the best possible service in all of the utilities without regard to imaginary dividing lines in these districts.

Another question which the voters of Detroit will be asked to decide at the Nov. 7 election is a charter amendment which will relieve the Detroit Department of Street Railways of paying for pavements between car tracks and transfer this item of expense to the Department of Public Works.

In his communications to the Council, asking that the amendment be submitted, the Mayor said that the cost of maintaining this pavement should not be borne by the car riders, but by the entire people. The law forcing the street car system to pay for this pavement was passed in old D. U. R. days, and the Mayor explains that the reason for it was that horses on the old horse-drawn vehicles wore out the pavement. This is done away with by the present modern type of street car, and it makes no difference to the car rider whether or not there is pavement between the tracks, the Mayor said.

CITY WILL NOT RECOGNIZE UNION

The Detroit Street Railway Commission has refused to enter into a signed agreement with the street car men's union and will not submit to arbitration the advisability of signing such agreement. The refusal was made in answer to a petition forwarded to the commission under date of Sept. 26, asking that an agreement as to working conditions on the municipal line be worked out similar to the agreement that existed between the union and the Detroit United Railway, signed shortly before the Detroit United Railway lines were taken over by the city. Judge Edward J. Jeffries was named by the union as its representative in the proposed arbitration.

In their reply the members of the Street Railway Commission suggested that while they believed action they had taken was in harmony with public policy, a definite action from the public could be obtained through a referendum.

The commissioners believe that it is against public policy to enter into formal agreement with unionized labor engaged in public employment. Likewise the question of arbitration is considered beyond the decision of any board representing only the employees and management of any single city department. The arbitration proposed is not considered to be within the limits of the city charter. In view of the fact that the stockholders and owners of the city system are the people of the city, the commission feels that it should not commit itself without an expression from the people.

Judge Jeffries told the car men that they were within their rights in stipulating conditions under which they would work, and that if they failed, organized labor in Detroit would be doomed.

MEN TO DEMAND ARBITRATION

A resolution was passed by the men citing that the request for arbitration of questions existing between the Department of Street Railways and its employees had been denied, although the city charter provides that the railway commission shall arbitrate any and all questions affecting the employees of the department. It was resolved that a committee be instructed to reply to the letter of the commissioners under date of Sept. 30, and in said reply demand arbitration as provided for in the city charter. Failing to receive a favorable reply the committee is instructed to call a special meeting of members of the union and for them to take such action as they deemed necessary.

Arbitration Award Leaves Wages Unchanged

A recent decision of the arbitration board formed to settle the wage dispute between the Berkshire (Mass.) Street Railway and its motormen and conductors leaves wages unchanged. Announcement has been made that the award was accepted by the company and the men.

The company sought a 20 per cent reduction and the employees asked for increases from 10 to 15 per cent. Both sides agreed to arbitrate when they were unable to come to a mutual agreement.

The company's arbiter was Attorney Barry of Hartford, Conn., and the employees named Attorney Vahey of Boston. Former Governor S. W. McCall was agreed upon as the third member. The award was signed by Messrs. McCall and Vahey. Mr. Barry did not sign, but both sides have agreed to accept the majority award.

Reservation Accepted

Dallas-Denton Electrification Will Be Started at Once—The Extension to Wichita Falls Now Awaited

With the acceptance by C. W. Hobson and associates of the reservation made by the city of Dallas, Tex., in its approval of the plan submitted by Mr. Hobson for the electrification of the Missouri, Kansas & Texas Railway line from Dallas to Denton and its use as an electric interurban in lieu of the second interurban which Mr. Hobson had agreed to build in return for the street car franchise granted in 1917, the final step was taken and the work of electrifying the Missouri, Kansas & Texas line will begin at once. The reservation imposed by the city in its approval of Mr. Hobson's proposal was that the $350,000 posted as a forfeit under the contract with the city should remain posted as a guarantee that the electrification plan would be carried out.

ORDERS TO BE PLACED SOON

Surveying crews will be put in the field shortly, it is announced, and as soon as surveyors show what special steel construction is needed, orders for material will be placed. The electrification should be completed and the line put in operation by the summer of 1923, Mr. Hobson says, as the work will be pushed with all possible speed.

Several routes are being considered for the new line to enter the city of Dallas. Under the contract between the Missouri, Kansas & Texas and the Texas Interurban Company, the interurban company leases the tracks of the Katy for a period of fifty years, with the right to electrify the line and operate it as an electric interurban for carrying passengers and express business.

The Katy will continue to operate the line as a steam railway for carrying freight. The Texas Interurban Company is to build a new line on which its cars will enter Dallas. This line will likely leave the present Katy tracks near Love Field, which is being developed as an industrial district for Dallas, and will enter the city from the north in such manner that a section of the city now without street car facilities will be served.

Residents of North Dallas have presented petitions to the City Commission asking that the Oak Lawn car line be extended out Cedar Springs Road, which will serve a big section of the city that is rapidly building up and is now without street car facilities. It is believed that this is a preliminary move in seeking to have the Denton line enter the city along Cedar Springs Avenue and the present Oak Lawn car line and Masten Street to the business district, thence to the Interurban Terminal Building on Young and Browder Streets. It is agreed that the Denton cars will use the interurban terminal as other interurbans running into Dallas do. The line which the Texas Interurban Company must build will be about 6 miles long.

Mr. Hobson announces that one-man cars will likely be put in operation on the Dallas-Denton line, although it has not been fully determined. The one-man cars, he says, can be operated more economically and at the same time give quicker service and a faster schedule. It is planned to maintain an hourly schedule at the start, and if business justifies, additional cars will be operated.

Electrification will cost about $1,500,000, according to estimates of engineers, the building of the 6-mile connecting link between the lines of the Dallas Railway and the steam railway near Love Field being the biggest piece of construction on the entire line. The stations at the various towns along the line will be used for joint stations, it is announced, except in Dallas and Denton. It is planned to build an extension in Denton and to build and maintain a new passenger station in the business district. The new line to be built there will be about half a mile.

While no announcement has been made, it is understood that Richard Meriwether, vice-president and general manager of the Dallas Railway and vice-president of the Texas Interurban Company, will have charge of the construction in the electrification of the line.

The Dallas-Denton line is looked upon as the beginning of the proposed interurban from Dallas to Wichita Falls, which was contemplated several years ago. The project seemed near to realization, but financial stringency on account of the war blocked the plans, after Dallas citizens had subscribed to $1,500,000 of the stock of the company and had raised funds for extensive surveys of three possible routes between the two cities. It is believed that once the interurban line is put in operation between Dallas and Denton, it will be a small matter to build the extension to Wichita Falls.

Another Part of the Katy to Be Electrified

The Oklahoma Railway, Oklahoma City, which operates in Oklahoma City and an interurban line out of Oklahoma City, is considering the proposition of taking over the railway line of the Missouri, Kansas & Texas running from Oklahoma City to Ateka, according to John Shartel, vice-president and general manager. This line of the Katy is 125 miles in length and serves thirty cities and towns in Oklahoma. Mr. Shartel announced that if negotiations now under way for the lease of this line by the interurban company are successful it will be electrified and operated as an interurban line. The electrification, it is understood, would involve an outlay of something more than $2,500,000. The franchise obtained by the interurban company would give that company the exclusive right to use the line for hauling passengers, while the railway company would continue to use the line for freight carrying purposes.

Extensions Given Consideration

Further extensions of the Boston (Mass.) Elevated Railway system are now being given serious consideration, both by the Elevated trustees and by the Massachusetts Department of Public Utilities, the latter tribunal being charged with the duty of making recommendations to the Legislature.

At a final public hearing on the subject, given by the Public Utilities Commissioners on Oct. 4, Mayor Curley of Boston complimented Chairman James Jackson of the Boston Elevated Board of Trustees for the way his board is handling the Elevated, but he argued that the establishment of a 5-cent fare or municipal ownership and operation may become the choice of the road.

There is a strong demand for the Boston Elevated to take over, by some process, the service of the Eastern Massachusetts Street Railway in Hyde Park and in Chelsea and Revere. What the attitude and plans of the Boston Elevated are toward this proposition, and the extension of the Elevated to other sections, was explained by Chairman Jackson. He said that it seemed obvious that the only way to relieve transportation conditions in the Hyde Park section was the extension of Boston Elevated service into that district. Further, that the trustees were ready to provide a service through lease or purchase upon terms that would not impose additional burdens upon those who were using the railway.

He discussed the situation north of Boston and referred to the proposed improved transportation for Chelsea and Revere.

Three Issues Settled in Franchise

A new franchise is in process of construction under which the Virginia Railway & Power Company will operate in the city of Portsmouth. An agreement has just been reached on three important points and an ordinance is now being drawn by the City Attorney covering these and minor details. The three major issues involved and upon which city and company are in accord are as follows: The company is to carry out its paving program incident to certain rerouting, after which paving obligation will be limited to $15,000 per annum; second, jitneys will be rerouted two blocks from car lines to avoid competition; third, the city recognizes the right of the Commission to regulate fares and service.

The importance of the last point in the agreement was recently emphasized in a decision of the Supreme Court of Appeals. The ruling dealt specifically with the case of Victoria vs. Victoria Light & Power Company, but affects all contracts with public utilities, companies and municipal governments. The ruling stressed the fact that no city of the State of Virginia has the right to fix fares and rates to be charged by the public utilities, but that the State Corporation Commission has the power to control fares and rates.

Rapid Transit and Water Power Made Political Issues at Albany

Both the Republican and Democratic parties in New York State have held their political conventions, nominated their candidates and adopted their platforms. One of the principal issues in the coming New York State campaign will be the matter of the Public Service Commission administration and the development of water power, both measures linked together under one common head.

The Republican platform goes squarely on issue as claiming credit to the Miller administration as an asset for all that has been accomplished in the matter of water power development and Public Service Commission achievements.

The Republican party platform adopted at Albany has the following to say in part in relation to rapid transit:

> In New York City transit conditions have for years been deplorable, and in 1921 had reached a critical stage. The transit facilities of the city were crowded beyond the point of human endurance. The equipment of many of the lines, cars and tracks alike, had been allowed to sink into a state of disrepair disgraceful to the city. With the surrender of many companies to receivership lines had been abandoned utterly; and whole systems covered by a single fare had disintegrated, with the resultant collection of double and often treble fares. Many hundreds of free transfer points had been abolished. The city was paying from taxes the interest upon its own investment in the rapid transit lines, designed by this time to have been paid from the receipts from operation. The 5-cent fare of the past had in effect disappeared. Most serious of all, in the face of enormous increases in traffic, not a new line had been provided for and even the completion of vital branches contracted for in 1913 had been delayed. The future was further complicated through the inability of the companies to borrow for construction purposes and the further fact that the constitutional borrowing power of the city had practically been exhausted.
>
> In this situation of chaos and confusion, with the local city administration either unwilling or powerless to act, Governor Miller and the state Legislature performed a great and timely service by intervening. This intervention involved no violation of the principle of home rule and no departure from precedent. From the beginning commissions having jurisdiction of rapid transit have been state commissions. This was so under the last Democratic state administration, which reorganized the commission but left it as a state appointed agency. Today by virtue of the orders of the transit commission hundreds of additional subway trains have been provided; new cars and other needed equipment have been ordered at a capital cost to the companies of more than $7,000,000 and the time brought measurably nearer when there will be a seat for every passenger in all but the peak rush hours. Inter-company leases have been or are about to be modified so as to reclaim millions for the benefit of service. Plans have been prepared for new lines and extensions and, what is of even greater practical importance, plans for raising the money to build the new lines without further use of the city's cramped credit have been devised.

The Democratic platform regarding the same subject says:

> We pledge the Democratic party to the enactment of statutes that will give the fullest measure of home rule to local communities in dealing with and regulating public utility corporations. Divided responsibility must cease and adequate power to discharge their duty given to local officials who are best fitted to solve the public utility problems of their community. We favor the delegation by the state to municipalities of power to control public utilities operating wholly within their limits. The state should retain the power to control only public service corporations whose activities are state wide.
>
> Repeal of the Miller legislation of 1921 which delegated power to the present disturbed transit commission without the consent of the elected officials of the local community, and regardless of existing contracts and franchises with public utility corporations. We confidently believe that a 5-cent fare on all street railways and lower gas, water, electric and telephone rates will then result. We endorse the vigorous opposition of the New York City administration and the officials of other cities in the encroachments authorized by these vicious laws on the rights of local communities.
>
> A law that will authorize cities, towns and villages to own and operate omnibus lines.
>
> Federal legislation which will prohibit the appointment by Federal judges of receivers for local public utility corporations or the issuance by them of injunctions restraining local authorities from administering and enforcing state laws or the provisions of franchises and contracts to which a community is a part.

The campaign will center from the standpoint of the issues raised, chiefly around the policy of the present administration in the regulation of public utilities. The Democratic program would entail fifty-seven Public Service Commissions, one for each city of the state. Legislation backing up such a program was introduced by the Democratic minority last winter but failed.

Commission Fixes Fares and Wages

The wage and fare issues in Mobile have been settled by a recent decision of the Alabama Public Service Commission. The commission had previously entered into an agreement with the Mobile Light & Railroad Company to the effect that when it acted upon the company's request for an increase in fare future wages of trainmen and other employees would be fixed at the same time.

Effective Oct. 1, 1922, the fare schedule is as follows:

City zone cash fare, 8 cents.
Tickets, four for 28 cents.
County zones, 6 cents.
School children's tickets, forty-ride books good for month of purchase at 3½ cents each, good going to or from school; not good on Sundays, Saturdays and holidays.
Transfers, 2 cents each, except between Government Street and Michigan Avenue free.

The above increase is an increase of 1 cent per fare, excepting school tickets, which remain the same as formerly. Transfers were formerly free.

The old and new wage scales in cents per hour are as follows:

Trainmen	Old	New
First year	41	39
Second year	43	41
Third year	48	46
One-man operators 4 cents per hour additional.		
Overtime at time and a half.		
Carpenters	Old	New
First class	74	69
Second class	72	67
Third class	64	59
Machinists		
First class	74	69
Second class	72	67
Blacksmiths		
First class	72	68
Mechanical utility men	47	45
Overtime at time and a quarter.		

Carhouse men, pitmen, armature winders, painters, linemen, welders, trackmen and all common labor and helpers are not members of a union, and their wages were not arbitrated, neither were the wages of the power house employees included.

Promised Type of Construction in Miniature to Win Public Votes

As a part of its advertising campaign to induce citizens to vote in favor of the proposed Sixteenth Street franchise and proposed charter amendment to relieve the company of paving obligations on new work, the San Diego (Calif.) Electric Railway has erected a booth in the city plaza at the corner of Third Street and Broadway, which attracts a great deal of attention.

The chief feature of the booth is a section of track showing the new type of construction adopted as standard by the company on all reconstruction and new work—twin steel ties, 100-lb. rails welded to the ties and with welded joints, all imbedded in solid concrete and with drain tiles on each side. A block of track has been sawed out so as to show every detail of construction, with ribbons running from the points of interest to placards on the wall explaining its superiority over the old type of construction. Photographs on the walls also give illustrations of the service the car company renders, and show some of the traffic conditions which cause accidents and delays through no fault of the company.

A man is in charge of the booth who explains the exhibits and gives out folders containing a brief argument in favor of the proposed franchise and amendment, and giving statistical information about the railway, showing that the company has already spent $400,000 in laying the new type of track ($100,000 on the Broadway line and $300,000 on the Logan Avenue line) and stating that the company is ready to spend an additional $740,000 on reconstruction if it is assured of fair play by the public, as will be indicated by the vote on Oct. 10.

The reconstruction proposed is listed as follows: University Avenue, $315,000; Adams Avenue, $200,000; Park Boulevard, $100,000; Market Street, between Sixth and Sixteenth, $50,000; Point Loma line, $75,000.

"The best street railway system in the State of California," is the mark set by General Manager Claus Spreckels in an announcement which has been made by him in the folder as issued.

All Utilities Included in Court Ruling

Full import of the recent decision of the California State Supreme Court relative to the power of the State Railroad Commission to compel utilities to cease operations has just been issued. The Supreme Court, by unanimous vote, sustained the commission. According to the legal department of the commission, the court's interpretation of the powers of the commission applies to all utilities in the State of California and not only to the case involving the Motor Transit Company, which sought a writ of review. This was dismissed by the court, which later handed down its decision.

Illinois Central Decides on 1,500 Volts D.C.

A 1,500-volt direct-current system for the electrification of the Illinois Central Railroad within the city limits of Chicago was announced Oct. 4 by President Markham. The plan was adopted as a result of recommendations made by a committee appointed in 1920 to study the subject. This committee, composed of several eminent heavy traction electrification engineers, made a thorough study of existing systems in this country and abroad before rendering the decision as to whether direct or alternating current should be used. The adoption of 1,500 volts d.c. practically determines the system to be used in all future terminal electrification work in Chicago. The announcement of the committee's decision was somewhat delayed by the loss of A. S. Baldwin, vice-president in charge of terminal electrification, who died on his way to Chicago after having made a detailed survey of European installations. His duties have fallen to D. J. Brumley.

The Illinois Central problem involves a heavy suburban passenger service, freight transfers between yards, switching in congested yards and eventually through passenger movements, all within terminal limits only. It is quite different from any electrification so far undertaken either in this country or abroad. The suburban passenger service will cover the main line from Chicago to Matteson, 28 route-miles; the Chicago branch, 4½ route-miles, and the Blue Island branch, 4.4 route-miles. The track-miles involved are 125.

In a short time after the electrifaction is completed it is estimated that 240 cars electrically equipped will be required. The number of trains per day will be about 350 and the total suburban train movement will amount to about 5,000 train-miles per day.

The freight service north of Roosevelt Road, next on the program, will cover more than 40 miles of track, and as this is mainly yard trackage it involves difficult electrification problems.

Unable to Repair Viaduct, Company Near Bankruptcy

The South New Orleans Light & Traction Company, operating from ten to fifteen cars, on a line connecting Algiers (opposite New Orleans) with McDonoghville and Gretna, in Jefferson Parish, admitted on Sept. 16 through its president, E. W. Burgis, that it was on the verge of bankruptcy. This statement was made by that official at a hearing granted the company by the Commission Council of New Orleans to show from its books why it was unable to repair the Newton Street viaduct in Algiers, closed three weeks ago by City Engineer Klorer as unsafe and a menace to life.

The franchise granted by the Commission Council of New Orleans provides for a 5-cent fare from the United States immigration station in Algiers to the Jefferson Parish line. Similar authority was granted the company by the Police Jury of Jefferson Parish for car fare from that parish line to the Court House in Gretna. Both franchises give the company the right to charge a 10-cent fare from the immigration station to the courthouse at Gretna, but this right has never been exercised and neither President Burgis nor E. Howard McCaleb, attorney for the company, would say whether they were contemplating a formal request for an increased fare rate.

The repairs needed to the viaduct, according to City Engineer Klorer, will cost $75,000 with an additional expense of $15,000 to keep it in safe condition for ten years. President Burgis claims that under present conditions his company is absolutely unable to meet this demand of the Council.

Educational Courses in Economics of Utilities Offered

Arrangements have been completed for a course in public utility economics to be offered in the Dallas School of Commerce of the Southern Methodist University at Dallas, Tex., beginning the last week in September. The course has been planned by and will be under the supervision of the Texas Public Service Information Bureau, in charge of George McQuaid, and of which C. W. Davis, vice-president and general manager of the Dallas Power & Light Company, is chairman.

The course is designed to present an orderly study of the important but not well-understood public utilities, their management and control, with adequate attention to the public relation and regulation under the laws.

Twelve lectures will be given during the fall term by men of signal ability who have made careful, practical studies of the public utilities in their several lines. Among the utility men who will deliver these lectures are G. H. Clifford, general manager Northern Texas Traction Company; C. W. Davis, general manager Dallas Power & Light Company; W. B. Tuttle, vice-president San Antonio Public Service Company, and others. The course includes the following topics: Light and power; street railways; interurban railways; the telephone; natural gas; manufactured gas; franchises; corporate set-up and financial aspects; legal aspects; customer ownership; accounting methods; service.

Sees Need of Trolley-Boys

Trolley-boys have been eliminated from the cars of the Salford (England) Tramways, although, according to the *Electric Railway and Tramway Journal*, Manchester still keeps them. District Secretary McLean of the General Workers' Union has sent a protest to the Tramways Committee urging the retention of trolley-boys on the ground of efficiency and safety. He said that the complicated overhead equipment in Salford required constant attention in order to avoid trolley difficulties.

News Notes

Railway Project in Japan.—A new route has been granted the Keehan Electric Railway, operating an interurban between Kyoto and Osaka, Japan. The capital stock of the existing company will not be increased, but instead a separate company will be established. A certain portion of stock will be raised from the general public.

Will Probe Railway.—A committee of three engineers representing the California Railroad Commission, the Bakersfield & Kern Electric Railway and the city of Bakersfield, Calif., will begin an investigation at once into the transportation problems affecting east and west Bakersfield. The committee will discuss fares and will prepare recommendations for increasing the revenue of the Bakersfield & Kern Electric Railway, now operating at a loss.

Advantage of Being Railway Employee.—For the fifth consecutive year the employees of the Indianapolis (Ind.) Street Railway are securing their domestic coal at cost. The sales are handled through the auditor's office. The men some time ago gave their orders and the coal is billed to the company. The men get the coal at exactly the cost to the company, plus what it costs to have the coal hauled from the switch to their homes. A saving of approximately $2 a ton is effected.

No Agreement on Franchise.—The East St. Louis & Suburban Railway, East St. Louis, Ill., and the city of Belleville have been unable to agree on the franchise for the operation of cars in that city. The City Council and certain civic organizations are opposed to granting the twenty-year franchise unless the company will build 1 mile of extension every five years of the time the franchise is to run and to pay for paving improvements between the rails. President Sawyer of the railway said that he could not promise improvements and that the company would be opposed to paying costs asked for by the Belleville City Council.

To Find Out What Business Men Think.—A referendum to ascertain the sentiment of the business men of Indiana regarding regulation of public utilities now is under way among members of the Indiana Bankers' Association, the Indiana Utility Association and one other organization. Approximately 4,000 business and industrial leaders in the State will be asked to express themselves before Oct. 18. In view of the attacks made on the Public Service Commission in the last year and because of the attempt to abolish the Commission by the introduction of a bill at the next session of the Indiana general assembly, the referendum is of added importance at this time.

Financial and Corporate

Valuation Hearing Resumed

Philadelphia Rapid Transit Contends Figures of City's Expert Are Inaccurate by Wide Margin.

The Philadelphia valuation hearings have been resumed. The action is the case before the Public Service Commission of Pennsylvania in an effort to fix a valuation for the property of the Philadelphia Rapid Transit Company upon which the company may be permitted to earn a return.

The figures of valuation presented by Robert M. Feustel, expert for the city, have been in the hands of the representatives of the railway for study over the summer. For purposes of review it may be said that Mr. Feustel's figures varied from $89,000,000 to $187,000,000 under several different bases of cost. The value of the property as claimed by the company is $290,000,000. It appears that the company has placed in evidence no figures based on the theory of original cost.

At the hearing on Sept. 26 Coleman J. Joyce, counsel for the company, explained that an exhaustive study of the available books and records of certified public accountants had convinced the accountants and had also convinced him that the original cost of the property of the Philadelphia Rapid Transit Company was and is absolutely impossible of determination.

No Figures Offered on Original Cost

For that reason and that reason alone the company offered no figures on original cost. He said that he had placed in evidence the result of the accountant's study and that he was satisfied that the record demonstrated that the conclusion he reached was sound. He contended that the city's attempt to arrive at cost on this basis—original cost—has simply served to strengthen his conviction that such a total must of necessity be utterly unreliable.

The disposition of the commission has been to conclude the case now as quickly as possible. It had fixed Oct. 15 as the date at which all testimony was to be in and had set Nov. 5 as the date for arguing the matter in Harrisburg. The hope of that body has been to hand down its findings before Jan. 1.

Mr. Joyce has disclaimed any desire on his part to delay the proceedings, but has indicated that questions have arisen in connection with the figures presented by Mr. Feustel that may make necessary extended cross-examination. He has put some of the alleged inaccuracies as ranging in amount from $1,000 to $70,000 on individual items.

Samuel Rosenbaum, assistant city solicitor, does not share with Mr. Joyce the opinion that the need may arise for protracting the hearings. In commenting on the errors alleged to have been discovered by the company in the city's valuation he is reported to have said:

> The tactics of the company are intended only for delay and to cover up the atrocities in the company's own case. If Mr. Joyce had conferred with our people with any frankness these insignificant errors would have been explained and we should have been able to finish this testimony before Oct. 1.

Mr. Rosenbaum admitted that there were certain errors in the printed statement of the city, but said that they were discovered shortly after the report had come from the printer, and that they were clerical or typographical errors that could be quickly explained and in any event would not affect materially the total as claimed by the city. He seemed to read into Mr. Joyce's remarks a disposition to inquire minutely into all the figures. This was a prospect not at all pleasing to him, for, he said, "if all of those who were engaged in preparing the city's report are to be cross-examined the proceedings will not terminate this year and maybe not for a year later."

Line Shows Profit

The Hartford & Springfield Street Railway, Hartford, Conn., operated at a profit during June and July in contrast to the losses sustained by the company for the same months a year ago. The receipts for June amounted to $20,028, with expenses totaling $17,337, or a profit of $2,691. This profit is compared with a loss of $1,777 for June, 1921. The Hartford division, however, shows receipts of $12,552, and expenses of $13,089, a loss of $537 against a gain of $3,197 for 1921.

The July report shows receipts of $22,777, and expenses of $17,977, a profit of $4,800, against a profit of $1,094 for July, 1921. The Hartford division shows receipts of $14,578, and expenses of $13,598, a profit of $980, against a profit of $4,287 for 1921.

Would Replace Demand Notes

Hugh McIndoe, a member of the Missouri Public Service Commission, has just held a hearing at Springfield, Mo., on the application of the Springfield Traction Company to issue $294,300 in second mortgage 6 per cent bonds to take up $294,300 of demand notes bearing interest at 8 per cent. These demand notes are held by the Springfield Railway & Light Company of Maine. They were given on account of advances made by the Maine corporation since 1913 for the purpose of making capital expenditures. The money was received as follows: $21,501 in 1914; $40,428 in 1915; $25,950 in 1916; $17,126 in 1917; $70,000 in 1918; $112,232 in 1920; $7,120 in 1921.

By substituting the proposed 6 per cent bonds for the 8 per cent notes there will be a saving of $5,836 in interest charges every year.

Commission Fixes Lower Valuation—Merger Refused

The fight is closed on the merger asked for by the Edison Electric Illuminating Company and the Cumberland (Md.) Electric Railway Company, in the decision of the Public Service Commission of Maryland, which sets a valuation on the properties within the merger which is far below that set in the valuation given in the application for the merger. The board, making an independent valuation, placed the total valuation at $600,000 below that given in the application, and the merger according to the decision is therefore refused and the merger fight closed for the present. The commission has set $1,700,000 as the value of the Edison Electric Illuminating Company and the Cumberland Electric Railway, which according to the application was to be merged into the Cumberland Edison Power Company. The valuation given in the application was $2,300,000.

It will be recalled that the Edison Electric Illuminating Company and the Cumberland Electric Railway sought this merger before the Utilities Board and that there was pronounced opposition represented by the minority interests in Cumberland and at Baltimore against the proposition, which was fathered by the local officers of the corporations represented.

It is felt in Cumberland that, the merger being dead, the matter of an extension of the street railway lines to the Kelly-Springfield plant should not be allowed to lapse. Under a contract entered into between the city of Cumberland, the Chamber of Commerce and the Cumberland Railway, at the time the Kelly-Springfield plant was brought here, a joint agreement was made under which the Cumberland Street Railway Company agreed to extend its lines to the Kelly plant. There is a general demand by the public and the Kelly people that this extension be made now, as conditions demand that there is a necessity for this extension. The Kelly people are known to require that this clause in the contract, a joint agreement entered into by the city and the Kelly company, be carried out. Now that a merger has been refused by the Public Service Commission, it is understood that the completion of the contract to extend the line to the Kelly plant will be demanded.

Will Abandon Point Gratiot Line

The Public Service Commission through its secretary has notified City Attorney Nugent that it will grant the application of George R. Bullock, receiver of the Buffalo & Lake Erie Traction Company, to abandon the Point Gratiot Street Railway, Dunkirk, N. Y. Besides the legal formalities the receiver will have to obtain the consent of the stockholders.

The line operated only in the summer months. A recent argument with local abutting property owners over paving resulted in the railway's petitions for abandonment.

New Corporation in New Orleans Functions

The New Orleans Public Service Corporation is now functioning and in active management of the New Orleans Railway & Light Company, which it has succeeded. A 7-cent fare went into effect on Sept. 27 at midnight.

R. S. Hecht was elected chairman of the board and was designated to act temporarily as president of the company. Seven directors of the company will have charge of its management. The personnel of the committee selected is as follows: J. P. Butler, J. D. O'Keefe, A. D. Parker, Harold W. Newman, G. M. Dahl and R. S. Hecht.

The city of New Orleans is really in control of the reorganization because fourteen of the sixteen directors are residents of New Orleans. They are J. F. Butler, president Canal-Commercial Trust & Savings Bank; Thomas F. Cunningham, president Board of Trade; D. D. Curran, vice-president Canal-Commercial Trust & Savings Bank; Lynn H. Dinkins, president Interstate Trust & Banking Company; R. S. Hecht, president Hibernia Bank & Trust Company; A. M. Lockett, president A. M. Lockett & Company; Hugh McCloskey, attorney; W. Irving Moss, president Union Indemnity Company; Harold W. Newman, president Association of Commerce; J. D. O'Keefe, vice-president Whitney Central National Bank; A. D. Parker, president Parker-Blake Company; W. S. Penick, president Penick & Ford Company; Paul H. Saunders, of Newman Saunders & Company; W. P. Simpson, president C. T. Patterson Company; Charles J. Theard, president Citizens' Bank & Trust Company; Mortimer T. Buckner, chairman of the board of the New York Trust Company; G. M. Dahl, vice-president Chase National Bank of New York.

Special Master in Chancery Chaffe, who is still in performance of these duties, is authority for the statement that such of the holders of securities who have not yet surrendered their holdings but who may yet desire to do so are privileged to communicate with him. The funds to meet payment of these securities will be obtained from the sale of the property recently effected by him.

The outstanding facts in the receivership, now about to be closed, show that out of a total bond issue of $18,500,000, there are now represented $18,200,073 in the new organization, the largest percentage, it is said, of record in a similar transaction.

Parent Company No Longer Needs to Finance Subsidiaries

The Cities Service Company, New York, N. Y., has announced that it will reduce its funded debt to the extent of $10,000,000 in the near future by a call for redemption, by conversion, or by purchase of that amount of its outstanding gold debentures of various series. The first call is now being made and involves the redemption of $3,000,000 par of the Series "B" issue.

The total amount of Cities Service Company convertible debentures outstanding in the hands of the public Aug. 31, 1922, was $32,035,091, all being of equal priority and of the same maturity date, 1966, but varying somewhat in respect to conversion privileges.

Of the total the Series "A" has been reduced through conversion to the negligible amount of $27,200, the amount of Series "B" debentures outstanding being $5,855,350, and the Series "C" and "D" making up the balance. It is understood that some of the recently issued 8 per cent debentures, Series "E," may be redeemed in connection with the refunding plan.

In retiring the $3,000,000 par of debenture "Bs," the company announced that it will call $500,000 of the issue as of Dec. 4, with similar calls from time to time until the total amount has been redeemed before Sept. 1, 1923.

In commenting on the decision of the board of directors to retire these debentures Henry L. Doherty, president, said:

> The debenture debt of Cities Service Company was created primarily for the financial assistance of subsidiaries of the company during the war period, when it was very difficult for individual operating companies—particularly the public utilities—to secure new money on their own individual credit. So much progress has been made during the last twelve months in strengthening the credit position of the subsidiary companies by the creation of open end mortgages for which there is a ready market, that the parent company may now turn its attention to a reduction of its own funded debt. In particular, the financing during the past year of the Toledo Edison Company, the Toledo street railway situation, the Ohio Public Service Company, the Denver Gas & Electric Light Company, the Empire Gas & Fuel Company and other subsidiaries has, of course, strengthened the position of Cities Service Company, which formerly was obliged to use its own credit and resources for the assistance of its subsidiaries.
>
> The improvement was by no means confined to the financial side, as operating conditions in all of the subsidiaries have equally improved in the last twelve months, and many of the companies are doing the greatest business in their history.

Key Route Reorganization Plan Now Assured

More than 91 per cent of the bonds involved in the proposed reorganization plan of the San Francisco & Oakland Terminal Railways, Oakland, Calif., have been deposited to be exchanged for securities to be issued under the new plan. Thus the success of the new plan is assured and attorneys are now preparing the necessary pleadings for foreclosure of the old mortgage. After this step a new mortgage will be created and petition will be made to the California Railroad Commission to authorize a new issue of securities. The entire reorganization of the company on a new basis can be completed, it is believed, by July 1, 1923. In anticipation of the funds to be made available by the new move, the company is contemplating the purchase of two new ferryboats and other equipment and has laid out a program for doing deferred maintenance work on rolling stock and throughout the system.

Buses Help Earnings to Achieve Record Gross and Net

The report for the year ended May 31, 1922, of the Aberdeen Corporation Tramways by William Forbes, general manager, shows a decrease from 42,953,807 passengers in the preceding fiscal year to 41,087,388 or 4.35 per cent. This was due to the depressed conditions during much of the year. At the same time the extension of the motor-bus and char-à-banc services served to achieve a new record in total earnings, viz., £196,268, compared with £195,313. This was achieved through motor-bus earnings rising from £3,842 (five months period) to £11,650, whereas tramway earnings fell from £191,471 to £184,618, or 3.58 per cent.

The net results were much better than the preceding year, owing to reductions in wages and materials that cut the operating expenses from £157,585 to £137,979, or 12.44 per cent. This left the gross profit at £46,639 or £12,754 more than the preceding year. The net after setting aside £31,550 for interest, sinking fund, depreciation, etc., was £15,089, which is the highest in Aberdeen's history. One-third of this has been paid over to the "Common Good and City Improvements" fund and the remainder of £10,059 has been placed in the reserve fund.

Motor-bus operation has been most successful. The earnings were £11,650 and the operating expenses £8,443. From the remainder of £3,207 the sum of £2,437 was deducted for interest and sinking fund. The capital expenditure for the buses is carried at £16,096. The nine buses in daily use carried 1,646,672 passengers with 157,808 bus-miles at 8 m.p.h. The average traffic revenue per bus-mile was 17.5d., and the average operating expenses, 12.8d., the operating ratio being 72 per cent.

The tramways carried 41,087,388 passengers with 2,252,889 car-miles with an average of eighty-nine cars. The traffic revenue per car-mile was 19.6d. and the operating expenses, 14.7d., the operating ratio being 71 per cent. Schedule speed was 7.6 m.p.h. While the buses carried 10.4 passengers per bus-mile, the cars averaged 18.24 passengers per car-mile. The population of Aberdeen is 158,000.

Court Orders Receiver to Pay

The case of the Columbia Trust Company, New York, N. Y., against the defunct City & Suburban Street Railway, Brunswick, Ga., sold in December, 1921, and succeeded since by the Brunswick & Interurban Railway, was settled recently when a decree was signed by Judge Barrett in the United States District Court at Savannah. Under the order Receiver Lisman is required to pay out the funds in his possession beginning with the accrued cost of the litigation and ending with the principal and interest covering any unpaid taxes in favor of the city of Brunswick and the county of Glynn. Compensation for receiver's services and premiums in receiver's hands are also included in the payments.

Discussion Renewed on Operating Consolidation of Twin Cities

Proposal of the public utilities committee of the City Planning Board of St. Paul, Minn., for an operating consolidation of the street railways of the Twin Cities bids fair to renew the discussion which has waged for years as to whether the Minneapolis Street Railway has been paying the deficit on the St. Paul City Railway. Doubt on this question promised to be settled by the recent separation of the Midway free district from both lines, so that all travel in St. Paul is credited to that city and all travel on interurban lines in Minneapolis proper is credited to that city. Now the committee proposes to present amendments at the winter legislature to the Brooks-Coleman act, a street railway supervisory measure, to permit the changes. The report says "their unification and consolidation is an absolute necessity essential to accomplish any of the objects specified. Without such consolidation the Railroad & Warehouse Commission is without power to fix uniform rates and even if it were by legislation given that power the grant, in our opinion, would be invalid."

Zurich Returning to Better Days Despite Depression

The report of the Zurich City Tramways for the calendar year 1921 notes that despite more liberal government concessions to workmen it was possible to cut operating expenses, particularly in reducing non-platform time. An energy-saving campaign also proved effective in cutting power from 0.927 kw.-hr. to 0.866 kw.-hr. per car-mile, an achievement which indicates the lighter weight of Zurich cars compared to anything but American safety cars. The preciseness of the Swiss temperament peeps out in the statistics of people employed and free baths given to the same, the ratio being 1,140 to 3,300. Free tea, amounting to 46,196 liters (a liter equals 1.056 quart), was another feature of the welfare work.

The number of passengers carried compared with 1920 shows a decrease from 47,562,187 to 46,660,218, or 1.89 per cent. Of the latter number, 50 per cent were carried as cash riders at fares of 20, 30 or 40 rappen (approximately 2, 3 and 4 cents), and the rest on a great variety of annual to monthly passes, limited-ride weekly cards, etc. The gross traffic revenue declined by 0.6 per cent, namely, from 11,806,147 francs to 11,716,327 francs (Swiss franc is at par). The total revenue was 11,913,368 francs and the operating expenses 9,697,837 francs, leaving 2,215,532 francs. In 1920 the operating expenses were 10,359,009 francs and the remainder only 1,626,511 francs. Part of the greater difference was due to a cut of 3.67 per cent in car-miles from the usual standard of five-minute headways. This made it possible to meet the same fixed charges as the preceding year while adding 637,554 francs to a special renewal fund for wiping off war-time losses. The operating ratio was practically 80 per cent. The undertaking ran 11,484,299 vehicle-kilometers (7,120,266 miles), of which 3,009,282 were trail-car kilometers.

Rehabilitation of Ohio Property Reported Progressing

Although official confirmation was lacking, it is reported in usually authentic circles in Springfield, Ohio, that J. L. Taylor and others interested in the rehabilitation of the Springfield, Troy & Piqua Railway, Springfield, Ohio, operating between Springfield and Troy, had obtained ample financial backing and are now prepared to go ahead with development of their line. Several persons who had subscribed for stock in the new company, which will take over the properties of the Springfield, Troy & Piqua Railway, have been approached in the last few days to ascertain whether or not their subscription was still considered valid by them.

H. H. Durr, Springfield, chairman of the citizens' committee on reorganization, said that he had not been informed as to the progress of the negotiations, inasmuch as the financial arrangements were being made with Chicago and Cincinnati bankers. Mr. Durr, however, believed that the rehabilitation project would be a success.

The line has not been operated for about two years, beyond switching service in Springfield and a shuttle car operated between the city and the plant of the Victor Rubber Company at Maitland, but the revenue from this source, interested parties said, was sufficient to cover upkeep of the road during the negotiations.

Financial News Notes

Reports Profit.—The gross earnings of the Havana Electric Railway, Light & Power Company, Havana, Cuba, for the period from Jan. 1 to July 31, 1922, were $7,537,006. The net profit amounted to $1,336,573.

Will Sell Road.—Ivor O. Wingren, special master, will sell the Colorado Springs & Cripple Creek District Railway, Colorado Springs, Colo., on Oct. 16 at the upset price of $200,000. The intangible property, claims, etc., will not be included in the sale offer.

Merger Approved.—Merger and consolidation of the underlying companies of the New Jersey & Pennsylvania Traction Company, Trenton, N. J., into the Trenton & Princeton Traction Company has been approved by the Public Utilities Commission. The consolidated company includes the line operating into Trenton, Lawrenceville and Princeton.

Spurs to Be Abandoned.—In the reorganization of the Syracuse & Suburban Railroad, Syracuse, N. Y., two spurs will be abandoned. They lead from Croly Street near the city line to Seeley Road and from Jamesville to the Onondaga County penitentiary. Plans for the reorganization of this property have been under way for some time.

Weaverville Line to Be Sold.—Preparatory to a receiver's report to the Superior Court an appraisal will be made of the property of the Asheville & East Tennessee Railroad, Asheville, N. C. The Weaverville line of the company will be sold at public auction on Oct. 23 and bids will be confirmed on the opening of Superior Court on Nov. 1.

Gold Bonds Offered.—Best & Company, Philadelphia, Pa., are offering at 96½ and interest to yield about 6.35 per cent $1,374,000 first and refunding mortgage twenty-year 5 per cent 1917 gold bonds of the Columbus, Delaware & Marion Electric Company, Columbus, Ohio. The bonds are due July 1, 1937. The interest is payable in January and July.

Receiver Hearing Postponed.—Judge Julius M. Mayer in the United States District Court has again adjourned the hearing until Oct. 10 in the proceedings for the appointment of a receiver for the Interborough Rapid Transit Company, New York, N. Y. This action was taken by Judge Mayer because of stipulations entered into by the attorneys representing all the parties to this litigation.

Earnings Decrease.—The gross and net earnings of the Capital Traction Company, Washington, D. C., for August, 1922, show a decrease compared with August, 1921. In the month of August, 1921, the gross income amounted to $121,709, against $92,071 for the same month this year. The net income decreased from $98,097 in August, 1921, to $68,522 in August of this year.

Bonds Called for Payment.—All the outstanding 6 per cent six-year bonds of the Barcelona Traction, Light & Power Company, Barcelona, Spain, dated Dec. 1, 1918, have been called for payment Dec. 1 at par and interest at the Sociedad Anonima Arnus Gari, Paseo de Gracia, I, Barcelona. More than 75 per cent of these bonds have been exchanged par for par into 7 per cent thirty-year bonds.

Gives Mortgage for Bond Issue. — The Cincinnati, Newport & Covington Railway, Covington, Ky., has given a first and refunding mortgage to the Central Trust Company, Cincinnati, as trustee for the stockholders to secure a bond issue of $7,500,000. The mortgages to the Farmers' Loan & Trust Company, New York, for $2,850,000 and $859,000 respectively will be canceled and the outstanding bonds of the Licking River Bridge Company for $185,000 will be discharged, as well as the $150,000 mortgage held by the Cincinnati Safe Deposit & Trust Company. The mortgage covers all the real and personal property of the mortgager and was authorized some time ago, in anticipation of the falling due of these obligations.

Traffic and Transportation

Discrimination Charged

New Haven Association Demands that Connecticut Company Reduce Fares —Storrs Makes Comment

Fares charged by the Connecticut Company have again become the talk of the hour. The company is charged with unjustly discriminating against New Haven, piling excessive fares on the residents of that city while Bridgeport and Norwalk ride on a 5-cent fare. This claim is made by the Grand Avenue Business Men's Association, whose executive committee has framed a set of resolutions outlining its complaints and demanding a square deal. The committee has decided to make a political issue of the matter and it is resolved "that the committee be empowered to present a questionnaire to the nominees for Governor and the Legislature of the State of Connecticut in such manner that the voters will know just how much effort will be put forth by these candidates if elected in remedying these conditions."

The association based its charges on figures submitted by the Public Utilities Commission, although the commission in releasing the figures stated that they were "without proper allowance for fixed charges, depreciation of physical property, or fair return upon the value of the plant and equipment."

According to the commission's figures the company's income for 1920, in the New Haven division, was $3,804,569; for 1921, $4,120,025. The operating expenses and taxes in the same periods were: 1920, $3,397,281; 1921, $3,099,548.

Figures for the Bridgeport division show: income, 1920, $1,506,112; income, 1921, $1,801,148. Operating expenses and taxes: 1920, $1,976,685; 1921, $1,896,148.

For four months ended Dec. 31, 1921, New Haven yielded an income of $1,435,734, while for four months ended Dec. 31, 1920, New Haven's income was $1,328,820.

Bridgeport, for the last four months of 1920, yielded an income of $476,363, and for the same period in 1921 the income was $508,959.

Charles E. Griffiths, president of the association, made a report to the committee in which he referred to the commission's refusal to lower the fare in New Haven and a subsequent refusal to reroute some of the company's lines in the same city. He charged the Connecticut Company with making up its losses in other cities at the expense of the New Haven rider. Further, that an immediate reduction in New Haven is justified in view of elimination of jitney competition and a continuous reduction in operating expenses. After hearing Mr. Griffith's report the committee adopted the set of resolutions.

In conclusion it was resolved that the questionnaire should be presented to the nominees.

In answer to the claims of the association President Storrs of the Connecticut Company stated that Bridgeport has not a 5-cent fare, but has a radial fare system under which 5 cents is charged all passengers on each side of the city or 10 cents across the city center with no reduced rate tokens. Also, that this is a special rate for a certain time.

Mr. Storrs further reiterated the comments of the commission that the figures were without proper allowance for fixed charges, depreciation, etc.

98,404,550 More Passengers in New York City in 1922

According to figures recently made public by the New York Transit Commission the total traffic, 2,590,313,728, on the surface, subway and elevated lines of New York City for the fiscal year ended June 30, 1922, represent an increase of 98,404,550 over 1921. Approximately 60 per cent of this volume of traffic was handled by the subway and elevated lines with 40 per cent being cared for by the surface lines. Still, the surface lines showed the biggest increase with respect to paying passengers—75,316,859 more passengers being transported on these lines than in 1921. This is compared with an increase of 23,087,691 carried by the rapid transit lines. The small increase on the subway and elevated lines has been attributed to the falling off of traffic on the Manhattan Elevated line of the Interborough. These figures were based on monthly reports filed with the commission.

Year ended	Number of Revenue Passengers	Annual Increase
June 30, 1903	1,000,767,483	61,777,519
June 30, 1906	1,251,841,173	120,838,479
June 30, 1910	1,531,262,914	128,845,272
June 30, 1913	1,709,876,508	88,962,573
June 30, 1916	1,898,735,615	91,102,889
June 30, 1918	1,975,482,316	56,670,087
June 30, 1919	2,079,944,297	104,461,981
June 30, 1920	2,365,587,369	285,643,072
June 30, 1921	2,491,909,178	126,321,809
June 30, 1922	2,590,313,728	98,404,550

The accompanying table, recently furnished by the commission, shows the enormous increase in traffic in New York City.

Passes Increase in Tacoma.—According to figures compiled by Richard T. Sullivan, manager of the Tacoma Railway & Power Company, Tacoma, Wash., the ninth week of the weekly pass system in use on the Tacoma railway shows a larger number of passes issued than for any previous week. There were 9,314 passes sold, in comparison with 9,177 for the eighth week, 8,247 for the seventh week and 8,686 for the sixth week.

Franchise Extension Sought

Pacific Electric Proposes to Spend $100,000 for Freight Service for Twenty-one Years

The Pacific Electric Railway filed with the City Council and the Board of Public Utilities of Los Angeles on Sept. 23 an application for an extension of the company's existing franchise for operation of freight service on the municipally owned tracks of the city of Los Angeles on San Pedro Street, which is a culmination of plans and negotiations that have been under consideration for more than a year by the Chamber of Commerce, the Pacific Electric and the city department. The object is the creation of a close-in wholesale, jobbing and light-manufacturing district, which would afford the city freight advantages at least approximating those similarly enjoyed by the wholesale districts of San Francisco.

The city of Los Angeles some eight years ago constructed the first unit of its proposed municipal line from Los Angeles to San Pedro Harbor, this first unit being on San Pedro Street in the city of Los Angeles from First to Ninth Streets, but the project was given up and the line was not continued for the remaining distance of approximately 21 miles to the Harbor at San Pedro. Under an operating franchise the Pacific Electric Railway has been operating its northern and southern division interurban cars over the municipal tracks on San Pedro Street as an artery for shortening the running time between Los Angeles and suburbs served by the company's lines.

The matter of freight service on San Pedro Street over the municipal line originated when the Westinghouse Company commenced negotiations for a site to erect its Pacific Coast plant at San Pedro and Fifth Streets and requested direct freight connections to serve same. Negotiations seeming favorable, the Westinghouse Company proceeded with the construction of its building. Being completed and ready for occupancy, freight connections are required and the Pacific Electric franchise application is for the purpose of guaranteeing permanence of operation sufficient to warrant an expenditure of $100,000 by the railway in widening San Pedro Street corners at two locations, in addition to easing up the present curves at these two locations sufficiently to permit of the passage of freight cars.

The franchise asks for a term of twenty-one years, and reserves to the city its rights in the trackage, either for its own use or for other freight carriers, and leaves other terms of payment as under the existing contract, also putting the entire expense of the improvement upon the railway company and limiting operation of freight cars on trains to the hours between 7 p.m. and 7 a.m.

The State Railroad Commission has already passed favorably on the operation of night freight service.

City Bus Service Must Cease

One of the most significant decisions as regards New York City transportation agencies was rendered on Oct. 4 by Justice George V. Mullan of the Supreme Court. His order enjoins the city authorities from "appropriating municipal funds for the purchase and operation of municipal motor buses and from operating or assisting in or supervising the operation of privately owned buses that are now being operated without franchise but with official sanction."

The ruling appears to kill the present city administration's plan to continue to permit private lines to operate without a license, and will prevent the Board of Estimate and Apportionment from expending any funds for the proposed bus system to be operated by the Department of Plant and Structures.

The decision rendered on the application of Edward Schafer as a taxpayer against the City of New York is in line with one recently made in Brooklyn by Justice Blackmar. Justice Mullan recognizes in his decision the noteworthy service that some of these buses have given, and the subsequent hardships that their discontinuance will work upon a patient public who have had to forbear inadequate transit conditions. "But," he said, "as Mr. Justice Blackmar has pointed out, the city authorities must, if they would better these conditions that so loudly cry for betterment, avail of the legal machinery that the people through the legislature have provided."

Seeks to Regain Patronage

The Oregon Electric Company, Salem, Ore., a subsidiary of the Spokane, Portland & Seattle Railway, has announced a decrease in its fares into Willamette Valley points from Portland, amounting to about 20 per cent, in an effort to regain a portion of the transportation business which had been lost to the automobile stages in operation along the routes. W. D. Skinner, traffic manager, announces that a fair trial will be given the new rates and if they do not help to make the line pay the plan will be abandoned. He said that the company showed a net loss of $84,219 during the first seven months of 1922, while the loss for the similar period of 1921 was $44,764.

The new tariff being prepared for the rail lines provides for a fare of $3.85 to Eugene, as against $4.41 at present, the proposed round trip being $6.65. To Salem the present fare of $1.84 will be cut to $1.50, with round trip rate of $2.50. Other reductions will be in proportion to all valley points touched by the bus lines. In all cases the new reduced fares are equal to those now charged by the automobile stages, and in addition, it is proposed to extend the limit of return tickets to fifteen days, instead of eight days, as at present.

The bus companies operating through the district outlined have agreed that no attempt will be made to cut under the rates to Willamette Valley, the bus operators expressing themselves as confident that the reduction in electric railway rates will in no way influence the volume of their business.

Appeal Set for September

Appeal of the Minneapolis (Minn.) Street Railway to the Supreme Court of the state from an order of the District Court to produce records showing disposition of $227,000 which it had had on deposit in Eastern banks has been placed on the December calendar. The order was issued by Judge F. M. Nye on July 25 requiring the company to produce certain records asked for by the city in its preparation of showing a valuation of the company's physical property before the State Railroad & Warehouse Commission as a basis of determining a permanent rate of fare. The company produced some, but appealed as to others. The company had until Oct. 8 to file its brief, but got an extension of thirty days. After Nov. 8 the city will have thirty days to file its brief and the company ten days for its rejoinder. W. D. Dwyer, the chief counsel for the company, said the delay is due to the absence of one of the counsel, Pierce Butler, in Toronto.

Lower Railway Fares Announced

Improved service at a decreased cost to the public is the intention of the Olean, Bradford & Salamanca Railway, Bradford, Pa., in meeting the rates of steam roads and offering inducements to commuters. A fare reduction is to be established whereby rates of fare on the interurban divisions will be reduced between 10 and 15 per cent when paying train cash fares and reduced in greater amounts when tickets are purchased at the ticket offices. The ticket fares will be reduced to those of the competing steam railway lines.

The general manager states that commutation tickets are to be issued between any two points on the road at approximately one-half fare for each of the fifty-four rides. These commutation tickets will apply for any purposes, such as business or school uses. A mileage book will be sold at 3 cents per mile good on any of the interurban divisions.

On the city divisions children's reduced rate tickets will be sold at the rate of five rides for 25 cents. Business and working people's commutation tickets on city divisions will be issued at twenty rides for one dollar, good between the hours of 6 and 8 in the morning and between the hours of 4:15 and 6:15 in the evening.

May Eliminate Skip-Stop Plan

In an effort to eliminate the skip-stop system now in vogue on the Fort Wayne, Ind., city car lines, an ordinance requiring street cars to stop at all street intersections along the lines if signaled by persons desiring to enter the cars was introduced at a recent meeting of the Fort Wayne City Council. The ordinance was referred to the committee on rules, regulations and ordinances. The skip-stop system has been in vogue on these car lines for the past five years. If the ordinance is passed an appeal to the Public Service Commission on the part of the Indiana Service Corporation is likely.

An ordinance is also contemplated by the Council requiring that transfers be given to all street car patrons as they enter the cars. If such an ordinance is put into effect there is a possibility of the weekly pass system now in effect being discontinued, street car officials state.

Transportation News Notes

Extends Hours for School Tickets.—The Virginia Railway & Power Company, Richmond, Va., will accept school tickets every day except Saturday and Sunday between 7:30 a.m. and 5 p.m. This means that the school children can use the special school tickets earlier in the morning and later in the afternoon than they have had the privilege of doing heretofore.

Company Has Ambitions.—Ride "Behind the Plow" and you will see all the good service seeds the Capital Traction Company, Washington, D. C., is sowing. The blossoming fruit will be the good will of the patron who will say "That's What I Call Service." At least that is the ambition of the railway according to the new pamphlet which it has recently started to issue entitled "Behind the Plow." Besides the usual run of jokes the sheet purports to tell the limitations and possibilities of the company in the matter of providing service.

Hearing on Fares Postponed.—The Public Utilities Commission has announced that the public hearing on the rates of fare charged by the Capital Traction Company, Washington, D. C., has been postponed from Oct. 9 to Oct. 16. It is said that when the commission takes up the application of the Federation of Citizens' Associations for a reduction in fare on the Capital Traction lines it is practically certain that the Washington Railway & Electric Company will renew its objection to different rates for the two systems.

One Man Car Issue Closed.—In view of the fact that a clause in the city ordinance of Salt Lake City, Utah, prohibits the use of one-man cars, the industrial commission of Utah has decided that it has no jurisdiction over the question of one-man car operation on the lines of the Utah Light & Traction Company's lines. The case was therefore dismissed by that body, before which the railway employees had brought the issue. The commission had referred the question to the Attorney-General's office and was advised that the city ordinance was controlling.

Personal Mention

Attends Twenty-one Conventions

C. D. Emmons, the New President of the American Association, Is a Consistent Progressive

C. D. Emmons, the new president of the American Electric Railway Association, who is president of the United Railways & Electric Company, Baltimore, Md., was elected to the highest position in the association on the year of his attaining his majority in attendance at the conventions. This is his twenty-first convention, for be it known that Mr. Emmons has been as faithful in attendance since becoming an electric railway man as he is in everything he does.

CIVIL ENGINEER BY PROFESSION

The new president is a Hoosier by birth. He studied civil engineering at the University of Pittsburgh, where he was graduated in 1892. His first railroading was in the steam field with the Pennsylvania Railroad. He remained with this company nine years, finally becoming supervisor of signals on the division which includes the Broad Street Station in Philadelphia

Mr. Emmons next went to Lafayette, Ind., where he operated the Lafayette Street Railway, and also did some construction work for the company. From Lafayette he went to Fort Wayne as general manager, and from there in 1911 to South Bend, where he was associated with the Chicago, South Bend & Northern Indiana Railway.

The next change took Mr. Emmons to the Boston & Worcester Railway in 1916 as vice-president and general manager. Two years later he went to the Boston Elevated Railway, but in August, 1919, left for his present position as president of the Baltimore company.

The association is deeply indebted to Mr. Emmons for the tireless and conscientious work he has done as the chairman of the meetings and papers committee this year. To him is due much of the success also of the midyear conference and of the program of the present convention.

Mr. Emmons has always been active in association work, and in his early days devoted much of his time to the Transportation & Traffic Association. He was also an active member of the Central Electric Railway Association when he was in Indiana. Mr. Emmons is one of the soundly progressive executives of the industry. He has sold the Baltimore people on his company and on the dependability and the completeness of its service to suit their every need.

Mr. Emmons is a member of almost every civic and other similar organization in Baltimore. He keeps in touch with his public, and he has as loyal a crowd of officials in his company as can be found in the whole country. The association may safely look forward to a year of real accomplishment and progress with Mr. Emmons on the job.

G. T. Seely Heads Transportation Association

Garrett T. Seely, vice-president and general manager of the Pennsylvania-Ohio Electric Company, Youngstown, Ohio, was elected president of the Transportation & Traffic Association at the Chicago convention. Mr. Seely graduated from the University of Illinois in civil engineering in 1899 and began his transportation work in the steam road field. He was connected with the engineering department of the Santa Fé Railroad while still in college and for a short time thereafter.

In 1900 he went to Chicago and was engaged in track elevation work for the Chicago & Western Indiana Railroad. The following year he became engineer maintenance of way of the South Side Elevated Railroad and was subsequently advanced to the position of vice-president and general manager. In 1911, when the four elevated railways in Chicago were consolidated as to operation and management, he was made assistant general manager of the combined system. He remained in this capacity until 1919, when he went to Youngstown to take charge of the operation of the railway and electric light properties in this vicinity. He is also president of the Youngstown Municipal Railway.

Mr. Seely has been active and interested in sectional and national association work and has held important offices in the Illinois Electric Railways Association, Central Electric Railway Association, National Electric Light Association and American Electric Railway Association. Mr. Seely is one of the outstanding and aggressive executives of the present day and he is esteemed very highly by his business associates and colleagues in the utility field, both for his ability and affability.

L. A. Lovell Oversees Financial Work

The board of directors of the Pacific Electric Railway, Los Angeles, Cal., has elected L. A. Lovell as auditor and secretary, according to announcement by D. W. Pontius, vice-president and general manager. Mr. Lovell will succeed H. A. Culloden, who is leaving the company to become auditor of the Minarette & Western Railway and its subsidiary companies at Fresno.

L. B. Denton has been appointed assistant to the chief engineer of the Pacific Electric Railway, Los Angeles, Cal.

L. C. Datz to Guide Engineering Association

L. C. Datz was elected president of the Engineering Association at the Chicago convention. He is at present acting as chief engineer of the Memphis Gas & Electric Company, Memphis, Tenn., and of the Little Rock Railway & Electric Company, Little Rock, Ark., now under supervision of the Electric Bond & Share Company, with his headquarters at Memphis. Mr. Datz comes to his present honorable post in the Engineering Association after a long and active term of service for the electric railway industry.

He is a graduate of Tulane University of Louisiana, where he completed a course in mechanical and electrical engineering in 1901. For a short time thereafter he was associated with a local contractor in New Orleans, designing and building dredge boats and dredging machinery. Not being able to pull himself away from New Orleans, he next took a position as chief draftsman and assistant engineer of the New Orleans Railway & Light Company, which he held for more than seven years. He rounded out his first decade of practical experience with a few months of service as secretary of Tulane University.

Taking up now the second decade, the first fourteen months of this he spent as engineer with Ford, Bacon & Davis, but returned as engineer for the New Orleans Railway & Light Company in May, 1912. With the beginning of the following year he became engineer of Southern properties, United Gas & Electric Engineering Corporation, which supervised the properties of the American Cities Company, also acting as vice-president of Southern properties of this corporation for the last two months of this period.

In April, 1919, he became chief engineer of the American Cities Company, taking his present position in April, 1922.

There is an interesting thing about Mr. Datz's career, namely, that since he left the university as secretary he has been with practically the same financial and engineering interests, although a number of different names of employers appear.

H. M. Atkinson Returns

Hugh M. Atkinson, chairman of the board of directors of the Georgia Railway & Power Company, Atlanta, returned to Atlanta the latter part of September after a trip of three months in France, Switzerland, Italy and Austria. Mr. Atkinson was accompanied by his wife, and the primary purpose of their trip was to visit the grave of their son, Captain Harry Atkinson, Jr., who was killed in action during the World War, and whose body is interred in a cemetery in France. Mr. Atkinson spent a large part of his time during the trip in making a study of economic and financial conditions in the countries visited.

Street Railway Pioneers Honored in Brazil

Electric railway and other engineers, including North Americans who have assisted in the development of Brazil's commercial development, are held in high esteem in that country. These and other interesting facts were brought out in an address at Rio to Secretary Charles E. Hughes on Sept. 9, when a delegation from the Engineering Club of Rio de Janeiro was received in audience by Mr. Hughes.

In a speech on that occasion, Sr. Getulio das Neves, the president of the Engineering Club of Rio, made this declaration and mentioned notable services of several American engineers who have worked in Brazil in times past, including Charles B. Greenough, who was instrumental in establishing the first street railway system in Rio, and F. S. Pearson, the noted electric railway engineer who at one time was connected with the Boston (Mass.) Elevated Railway and Metropolitan Street Railway of New York, and later was largely interested in the Rio de Janeiro tramways.

In speaking of Mr. Greenough, Sr. Getulio said: "A recent ordinance of the municipal administration of this city has just recognized the merit of Greenough by decreeing, at the request of the Engineering Club, that one of the public places in the capital city of Rio shall be given the name of this notable American administrator." Further on Sr. Getulio said: "Desiring to recognize in a concrete manner the progressive spirit of North America in the southern part of our continent, the Engineering Club has placed in its hall of fame a bust of Pearson, victim of the torpedoing of the Lusitania. This bust, Mr. Minister, is placed in the salon where is placed also the bust of Don Pedro II, the wise and magnanimous ruler, who, in his fifty years of governing, did so much for engineering and industry in Brazil."

R. J. McElravy Resigns as General Manager

R. J. McElravy, general manager of the Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, has resigned. This will terminate an association of twenty-five years with C. A. Smith, president of the company. Mr. McElravy plans to rest for two or three months before engaging in other business.

His association with the East Liverpool property started in 1915 when Mr. McElravy was appointed general superintendent of transportation and purchasing agent. At that time Mr. Smith was general manager of the company. The two men had been in various business enterprises together during the previous eighteen years, and Mr. McElravy had acted as manager of the real estate interests of Mr. Smith.

In 1917 when Mr. Smith became president Mr. McElravy was appointed his successor as general manager.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Governor's Price for Coal Not Yet Effective

The advent of cold weather and the usual seasonal household demand will increase the need for domestic fuels. According to *Coal Age* this market is not yet in full swing, but domestic quotations for Oct. 4 have all the earmarks of further increases as the short supply will be accentuated by orders placed as a substitute for hard coal. This demand will fall largely on producing districts not usually called upon to furnish coal for domestic use, but will doubtless also lead to emergency shipments eastward of high-grade domestic from fields west of the Allegheníes.

The steam consumer is purposely staying out of the market and is taking little coal aside from current needs. In the Middle West he is able to obtain this tonnage by picking up bargain lots which are still sent in on consignment, often being sold under pressure of heavy demurrage. Screenings have been selling on a par with mine-run, but with the apathetic steam market and the better domestic call more operators are screening their output, and this is fast softening the resultant sizes.

Normal production of anthracite is being retarded by the same conditions that hamper the soft-coal industry—lack of cars and poor transportation. There also is a dearth of labor. The effect of the car shortage is only just now being felt.

W. B. Potter Points Out Important Railway Development

A representative of the *Electric Railway Journal* asked W. B. Potter, chief engineer railway department, General Electric Company, what he considered the most important feature shown in the exhibits of this convention. Mr. Potter said probably the most important single engineering feature was represented by the devices for the automatic control of substations, hydraulic power stations and centers of power distribution. The substitution of automatic operation, either wholly or in part, through remote control of the apparatus in place of the several shifts of personal attendants required for direct operation means a material saving in the operating expense as well as insurance against mistakes in handling the machines. The economic results of automatic control will unquestionably have a favorable influence on all electrical development for lighting industries and electric railways. It will contribute an important feature advantageous to steam railway electrification.

ELECTRIC RAILWAY MATERIAL PRICES—OCT. 3, 1922

Metals—New York

Copper, electrolytic, cents per lb	14.00
Lead, cents per lb	6.425
Nickel, cents per lb	36.00
Zinc, cents per lb	7.225
Tin, Straits, cents per lb	33.00
Aluminum, 98 to 99 per cent, cents per lb	21.00
Babbitt metal, warehouse, cents per lb.:	
Fair grade	25.00
Commercial	15.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$8.05
Somerset mine run, Boston	4.625
Pittsburgh mine run, Pittsburgh	4.25
Franklin, Ill., screenings, Chicago	3.875
Central, Ill., screenings, Chicago	3.375
Kansas Screenings, Kansas City	....

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb	2.80
Tie plates (flat type), cents per lb	2.425
Angle bars, cents per lb	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.125
Steel bars, cents per lb	1.95
Ties, white oak, Chicago, 6i n. x 8 in. x 8½ ft.	1.40

Hardware—Pittsburgh

Wire nails, base per keg	2.70
Sheet iron, (24 gage), cents per lb	4.55
Sheet iron, galvanized, (24 gage), cents per lb	5.25
Galvanized barbed wire, cents per lb	3.35
Galvanized wire, ordinary, cents per lb	2.45

Waste—New York

Waste, wool, cents per lb	15.00
Waste, cotton, (100 lb. bale), cents per lb.:	
White	14.00
Colored	12.00

Paints, Putty and Glass—New York

Linseed oil, (5 bbl. lots), cents per gal	91.50
White lead, (100 lb. keg), cents per lb	11.625
Turpentine, (bbl. lots), per gal	$1.36
Car window glass, (single strength), first three brackets, A quality, discount*	85.5%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength, all sizes, A quality), discount*	86.0%
Putty, 5 lb. tins, cents per lb	6.50

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb	15.625
Rubber-covered wire, No. 14, per 1,000 ft	6.50
Weatherproof wire base, cents per lb	16.00

Paving Materials

Paving stone, granite, 4 x 8 x 4, f.o.b. Chicago, dressed, per sq.yd	$3.35
Common, per sq.yd	3.10
Wood block paving 3½, 16 treatment, N. Y., per sq.yd	2.29
Paving brick, 3½ x 8½ x 4, N. Y. per 1,000 in carload lots	50.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd	1.75
Cement, Chicago consumers net prices, without bags	2.675
Gravel, ¾-in., cu.yd., N. Y	1.75
Sand, cu.yd., N. Y	1.00

Old Metals—New York

Heavy copper, cents per lb	12.00
Light copper, cents per lb	10.25
Heavy brass, cents per lb	6.787
Zinc, old scrap, cents per lb	3.687
Yellow brass, cents per lb (heavy)	6.25
Lead, heavy, cents per lb	5.00
Steel car axles, Chicago, net ton	$19.75
Old car wheels, Chicago, gross ton	23.50
Rails (short), Chicago, gross ton	20.75
Rails (relaying), Chicago, gross ton	30.00
Machine turnings, Chicago, net ton	11.25

Klein Talks on Americanizing American Exporting

A real old-fashioned housecleaning to eliminate the "fly-by-night" trader, the non-American "hanger on" and the unscrupulous and insincere element generally from the American export field was advocated on Oct. 3 by Dr. Julius Klein, Director of the Bureau of Foreign and Domestic Commerce of the Department of Commerce, speaking before the Export Managers' Club in New York.

According to Director Klein, our exports are now moving out at the impressive rate of nearly $4,000,000,000 a year—a formidable figure which is vital to the stability of our whole industrial and commercial edifice. It must not be jeopardized by the dealings of "irresponsible opportunists."

The function of the Bureau of Foreign and Domestic Commerce, Director Klein explained, is to promote American commerce abroad. Whether the manufacturer or merchant requesting aid is large or small makes no difference. The biggest corporations and banks in the country make constant use of the bureau. It is also being called upon every day by thousands of small factories and dealers whose individual export interests amount to less than $10,000 a year. In the week ended Sept. 23 the bureau's New York office handled foreign trade problems for no less than 10,200 inquirers whose transactions were of all sizes and descriptions.

Director Klein predicted a gradual but sound rebuilding of our export trade and said that the Department of Commerce is making every effort to bring the profits from it into every small manufacturing village in the country.

Track and Roadway

Hydro-Electric Power Commission of Ontario will construct a hydro-radial line from Port Credit to St. Catherines in Burlington, Ont. This improvement has been approved by the Town Council.

Olean, Bradford & Salamanca Railway, Olean, N. Y., proposes to build a spur switch in Salamanca from its main line into the Erie station grounds. This step is part of an improvement plan for the relief of traffic.

The Northeast Oklahoma Railroad, Miami, Okla., has extended its line past the plant of the B. L. Crose Mining Company at Treece, Kan. Railroad cars can now be loaded with ore adjacent to the mine.

Schenectady (N. Y.) Railway has practically completed laying its tracks for the new belt line. When the Aqueduct-Rexford bridge is completed the line will operate to Aqueduct across the Mohawk River to Rexford and back to Schenectady.

New York, N. Y.—The Transit Commission has approved a contract between the Brooklyn Rapid Transit Company and the Harris H. Uris Iron Works for the lengthening of platforms on all stations of the Brighton Beach Line, Brooklyn, south of Gates Avenue station. The cost of the work will be $180,710.

Los Angeles (Calif.) Railway has completed track reconstruction on North Main Street and on West Thirty-ninth Street. Two new track improvements are now under way. Track will be reconstructed and the surface paved on Florence Avenue between Pacific Boulevard and Seville. At Manchester and Vermont the grade has to be lowered 2½ ft. to conform with the new grade of Manchester Street which is being paved by the city.

Portland Railway, Light & Power Company, Portland, Ore., has been granted a twenty-five year franchise, by unanimous vote of the City Council, for the operation of its cars on Foster Roadway. No opposition against the franchise developed. The railway company held a private right-of-way on Foster Road, which was relinquished in order that the road might be improved, the railway taking a franchise for the tracks in the center of the road.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., has begun excavating in Edmond Street, between Second and Third Streets, preparatory to laying new heating pipes from Edmond Street is repaved from Second to Eighth Streets. Company officials said that as fast as the pipes are laid another force, working behind the pipe-laying job, will begin tearing up the old asphalt between the car tracks. All the material is on hand and the single track, which is to replace the old double track, will be laid without delay.

Power Houses, Shops and Buildings

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has placed in operation a new 10,000-kw. turbine at the Water Street power plant. The turbine weighs 360,000 lb. Twelve freight cars were required to handle the shipment.

Chicago, Aurora & Elgin Railroad, Aurora, Ill., has purchased equipment from the General Electric Company for two new automatic substations, each to be equipped with a 1,000-kw. unit. These stations will be located at Bellwood and Wheaton. This company has one automatic substation in operation. A supervisory control will also be installed to include all three stations.

The Indiana Service Corporation, Fort Wayne, Ind., has purchased a plot of ground 400x600 ft. on Spyrun Avenue, Fort Wayne, adjoining the company's property for the purpose of building a new carhouse and car storage yard. As soon as building conditions are favorable a contract will be let for the construction of a three-bay building comprising two inspection houses and one wash house. Later light repair buildings will be constructed. There will be open storage capacity in addition to that in the houses so that the total facilities will take care of 200 city cars and seventy-five interurbans. The cost of this layout will be approximately $500,000.

Rolling Stock

Cleveland (Ohio) Railway has ordered fifty Peter Witt motor cars and fifty trailers from the Kuhlman Car Company, Cleveland. It was announced in the Aug. 5 issue of the *Electric Railway Journal* that the directors had approved such purchase.

Indiana Service Corporation, Fort Wayne, Ind., has ordered fifteen new safety cars of the double-door type, as used heretofore in this city, from the St. Louis Car Company for delivery around Nov. 30. These cars and eighty of the company's present safety cars are to be equipped with National Pneumatic Company door engines to relieve the operators. This company is also equipping all of its ninety-five cars with Nichols-Lintern signals and is equipping eight of its interurban cars with multiple unit control to eliminate the operation of trains in two sections and avoid the use of trailers.

Trade Notes

General Electric Company, Schenectady, N. Y., through President Swope has announced that a bonus of 5 per cent in cash or in securities redeemable in cash, will be paid to each employee receiving compensation of $4,000 or less annually, who has completed five years or more of continuous service on Jan. 1 or July 1 of each year.

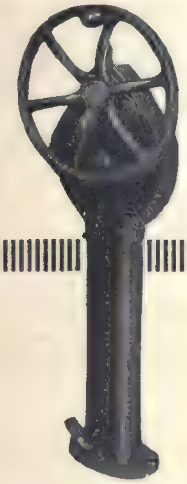
M. F. King, formerly of the Kings Refractories Company, has joined the sales and service department of the Quigley Furnace Specialties Company. Mr. King brings to the Quigley organization the benefit of his wide experience in the application of refractories and high temperature cements, and will devote his attention to service and sales work in New York City.

New Advertising Literature

The English Electric Company, London, England, has issued publication No. 368 on cable spans by E. Parry, B.Sc., M.I.C.E., M.I.E.E.

Roller Smith Company, New York, N. Y., has issued Bulletin No. B-820. This bulletin describes the direct current P. V. ammeters and voltmeters and C. O. D. indicators for automotive vehicles, farm lighting plants, battery charging outfits, etc.

Gould Coupler Company, New York, N. Y., Gould Coupler Company, Chicago, Ill., have just issued their second edition catalogue on Gould Universal automatic slack adjusters (Sauvage patents). This edition contains cuts, photos, and descriptive matter of the different electric railway type slack adjusters manufactured. The steam railroad types are not in this issue.



"Power" "Capacity"

"Speed"

The Peacock Staffless Brake

Designed especially to meet the requirements of the safety car, it is, like the safety car itself, a unique and successful departure from old-fashioned standards.

In braking force it is designed with full allowance for the unusually high live-load ratio which occurs on these featherweight cars.

In chain winding capacity it will take up all the chain that comes, no matter how slack the rigging may be. The drum construction and the housing surrounding it are such as to obviate all chance of jamming the chain. It is a powerful, fast and unusually safe brake.

Occupies minimum platform space.

Send for blueprints and include Peacock Staffless brakes in the design of your safety cars.

NATIONAL BRAKE COMPANY, Inc.

890 Ellicott Square
Buffalo, N. Y.

Canadian Representative: Lyman Tube & Supply Co., Montreal, Can.

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Business Established 1894
115 BROADWAY, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

STONE & WEBSTER
Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
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ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER POLYTECHNIC INSTITUTE
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JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
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Investigations, Appraisals, Expert Testimony, Bridge and Structural Work, Electrification, Grade Crossing Elimination, Foundations, Power Plants

HEMPHILL & WELLS
CONSULTING ENGINEERS
Gardner F. Wells John F. Layng Albert W. Hemphill
APPRAISALS
INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

JOHN A. BEELER
OPERATING, TRAFFIC AND RATE INVESTIGATIONS
SCHEDULES—CONSTRUCTION—VALUATIONS
OPERATION—MANAGEMENT
52 VANDERBILT AVE., NEW YORK

A. L. DRUM & COMPANY
Consulting and Constructing Engineers
VALUATION AND FINANCIAL REPORTS
RATE STUDIES FOR PRESENTATION TO PUBLIC SERVICE COMMISSIONS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
76 West Monroe Street, Chicago, Ill. 510 Penn Square Bldg. Philadelphia, Pa.

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

PETER WITT
UTILITY CONSULTANT
456 Leader-News Bldg., Cleveland, O.

ROBERT M. FEUSTEL
CONSULTING ENGINEER
Rate, Traffic and Reorganization Investigations
Fort Wayne, Indiana

WALTER JACKSON
Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
143 Crary Ave., Mt. Vernon, N. Y.

Parsons, Klapp, Brinckerhoff & Douglas
WM. BARCLAY PARSONS H. M. BRINCKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
CLEVELAND 1570 Hanna Bldg. NEW YORK 84 Pine St.

AMERICAN BRIDGE COMPANY

EMPIRE BUILDING, 71 BROADWAY, NEW YORK

Manufacturers of Steel Structures of all classes, particularly

BRIDGES AND BUILDINGS

Sales Offices:

NEW YORK, N. Y.……71 Broadway
Philadelphia, Pa.……Widener Building
Boston, Mass.……120 Franklin Street
Baltimore, Md.……Continental Building
PITTSBURGH, PA.……Frick Building
Buffalo, N. Y.……Marine National Bank
Cincinnati, Ohio……Union Trust Building
Atlanta, Ga.……Candler Building
Cleveland, Ohio……Guardian Building
Detroit, Mich.……Beecher Ave. & M. C. R. R.
CHICAGO, ILL.……208 South La Salle Street
St. Louis, Mo.……Liberty Central Trust Bldg.
Denver, Colo.……First National Bank Bldg.
Salt Lake City, Utah……Walker Bank Building
Duluth, Minn.……Wolvin Building
Minneapolis, Minn.……7th Ave. & 2d St., S.E.

Pacific Coast Representative:
U. S. Steel Products Co., Pacific Coast Dept.
San Francisco, Cal.……Rialto Building
Portland, Ore.……Selling Building
Seattle, Wash.……4th Ave. So., Cor. Conn. St.

Export Representative: United States Steel Products Co., 30 Church St., N. Y.

Byllesby
Engineering & Management
Corporation
208 S. La Salle Street, Chicago
New York Tacoma

KELLY, COOKE & COMPANY

Engineers

149 BROADWAY
NEW YORK

424 CHESTNUT STREET
PHILADELPHIA

The Corporation Service Bureau
D. H. Boyle, President L. A. Christiansen, Vice President
A. B. McLean, General Manager
LABOR ADJUSTERS
Investigations—Inspections—Confessions
GENERAL OFFICES:
Suite 1215, Ulmer Building, Cleveland, Ohio

J. N. DODD
1211 Chestnut Street, Philadelphia, Pa.
Planning and Equipment of City Rapid Transit Lines
Special Investigations

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
Chicago Youngstown Dallas
Los Angeles Montreal Rio de Janeiro

DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

THE P. EDWARD WISH SERVICE
50 Church St. *Street Railway Inspection* 131 State St.
NEW YORK DETECTIVES BOSTON

SANGSTER & MATTHEWS
Consulting Accountants
Valuation and Rate Specialists
Depreciation Consolidations Rate Schedules
Reports to Bankers
25 Broadway, NEW YORK
134 South LaSalle Street, CHICAGO

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Did You
Meet Us on the Pier at Chicago?

We showed you some Catcher and Retriever Stunts.

Do you use one-man cars with a single pole that has to be reversed? Let us show you.

Have you found your trolley base supports weak? Your Catchers haven't been working.
Let us explain.

Do you find that your Catchers don't take in the rope in wet weather?
Take a look at our Free-winding spring.

Have you had the advantages of the *ratchet wind* for Retrievers explained—or of the *emergency release?*

Do you like to load your cars with eighty pounds of Retrievers when thirty will do the work as well or better?

Get the latest Catcher and Retriever tips.

C. I. EARLL, York, Pa.

EARLL

TROLLEY CATCHERS AND RETRIEVERS

1922 A.E.R.A. Exhibit Features

INDUSTRY can develop only to the extent that it encourages the production of improved means for serving its public. The electric railway industry owes much to the progressive manufacturers of equipment, materials and supplies such as were exhibited at this year's convention.

Every exhibit on the Pier carries a lesson for the electric railway executive. It is only through adequate information regarding the products offered by the manufacturers in the field that intelligent decisions and purchases can be made. The exhibit was well worth thorough inspection in detail and some of the features were worthy of special attention. Some of these features of the 1922 exhibit are displayed in the advertising pages of this section. The manufacturers whose advertisements appear herein have availed themselves of this means of calling special attention to their exhibits.

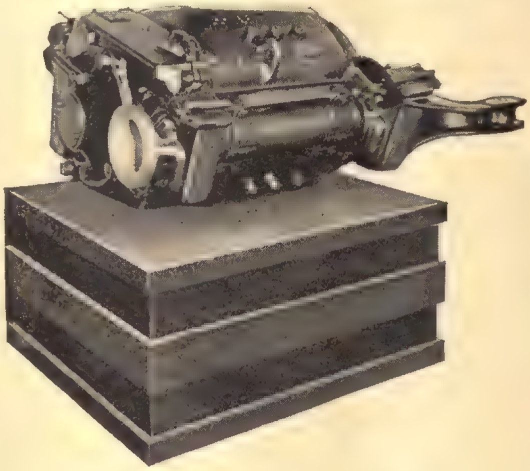
Make the most of it

1922 A.E.R.A. Exhibit Features

Westinghouse Railway Equipment

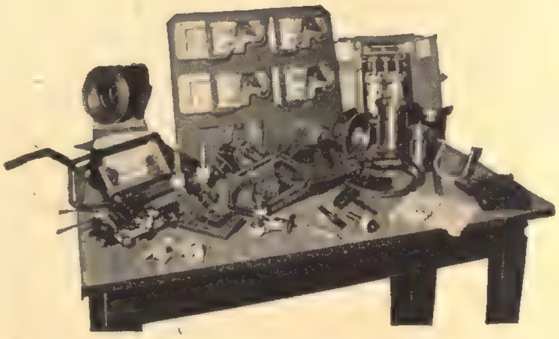
The Westinghouse Company has placed on exhibit at the 1922 convention, for inspection and observation by all operating men, a representative display of practically its entire line of up-to-date railway equipment.

Westinghouse Standard Motors are the result of more than 30 years' designing and manufacturing experience, and each motor embodies all improvements of value known to operator and manufacturer.



Westinghouse Standard Motors

No. 508— 25 hp.
No. 510— 35 hp.
No. 514— 40 hp.
No. 532— 50 hp.
No. 306— 65 hp.
No. 548—100 hp.
No. 333—125 hp.
No. 557—140 hp.
No. 567—165 hp.
No. 577—200 hp.



Westinghouse Renewal Parts and Accessories for Westinghouse Motors and Control

The functions of each detail have been analyzed individually and collectively, in order to produce efficiency, durability and full operating satisfaction.

Among the important features of advantage in Westinghouse Railway Motors are light weight, large capacity, self-ventilation, and the strength of parts resulting from the use of high-grade materials.

Westinghouse Electric &
Manufacturing Co.,
East Pittsburgh, Pa.

Westinghouse

1922 A.E.R.A. Exhibit Features

Westinghouse Trolley Line Material

The Westinghouse Exhibit of Direct-Suspension Line Material contains everything used in direct suspension, from a trolley ear to a section insulator. The pieces are so arranged on a board as to be easily detached for convenient examination.

Direct-Suspension Line Material

Catenary-Suspension Line Material

The Westinghouse Exhibit of Catenary Line Material is arranged in the same manner as the direct suspension. It embraces Messenger Insulators and Pins, Steady Strains, Hangers and other miscellaneous fittings.

There is also a special board showing our new "Duro" moulded strain Insulator.

Westinghouse Electric &
Manufacturing Co.,
East Pittsburgh, Pa.

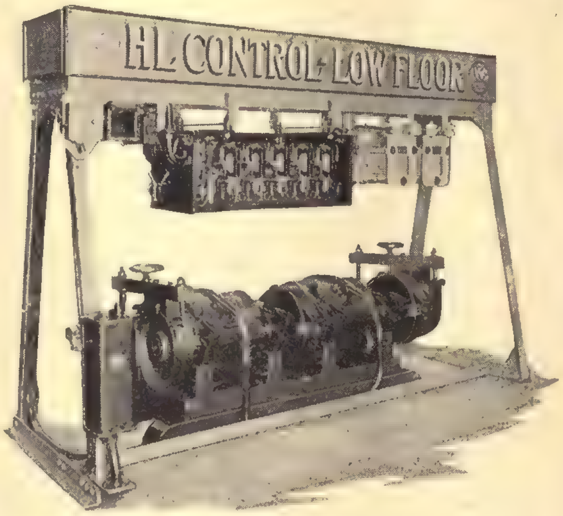
Westinghouse

1922 A.E.R.A. Exhibit Features

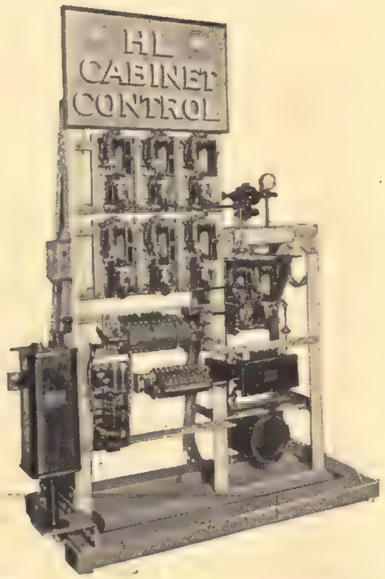
Westinghouse HL Control

which has been the popular standard of the country for the past 14 years for all classes of multiple-unit operation and heavy-duty service, is a striking example of Westinghouse engineering efforts to produce substantial devices for the industry's benefit.

The reason for the superiority of this control is the correctness of principle and performance of the design. These characteristics form the basis that has made it possible to add the many refinements, that have been developed, without destroying the interchangeability of parts and "HL" originality.



Westinghouse HL Control for Mounting Under Car Floor



Westinghouse HL Control for Cabinet Mounting

The same elaborate and thorough facilities employed to produce motors and control of superior quality are used in the manufacture of RENEWAL PARTS.

Each process is backed by experienced engineering, rigid inspection and exceptional research organizations.

The Westinghouse Company is continuously using its best efforts and vast resources to improve its products and to assist operators perfect maintenance methods. DIPPING and BAKING of motor windings are Westinghouse devices.

Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.

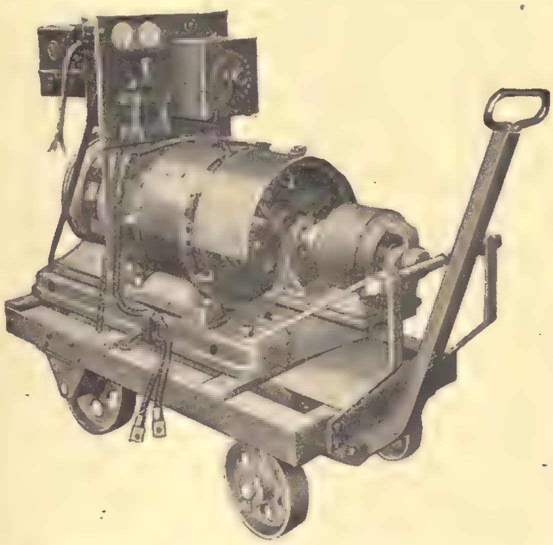
Westinghouse

1922 A.E.R.A. Exhibit Features

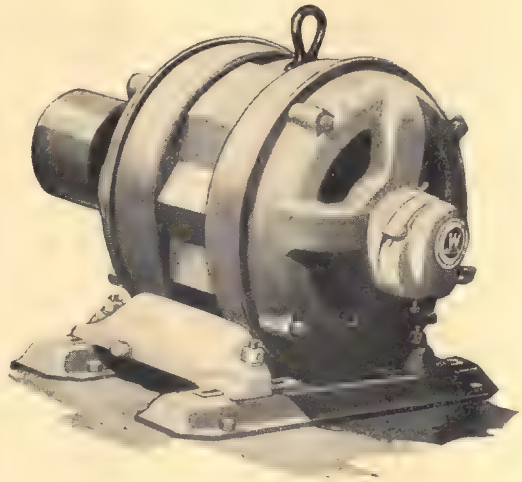
Railway Shop Equipment

The Westinghouse Arc Welder is one of the interesting features of the Westinghouse Exhibit.

With this set the operator can get those fine differences in arc current which assure just the right heat for the work to be done. It is this that guarantees better welds and speedier work and relieves the operator of all uncertainty as to the results attained.



175-Ampere
Portable Welding Equipment



Type SK Direct Current Motor

The Westinghouse Arc Welder is rapidly becoming an indispensable repair tool in the railroad shop.

Other features of the Westinghouse Exhibit are Westinghouse machine tool motors and control. A complete line of both a.c. and d.c. motors, with their control equipment, are available for railroad shops.

No shop should be without the economies and the conveniences of motor drive.

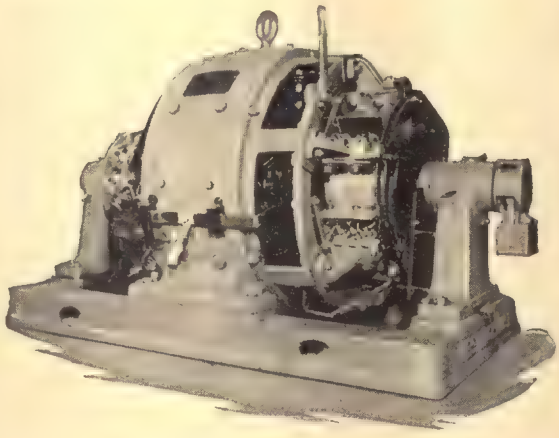
Westinghouse Electric &
Manufacturing Co.,
East Pittsburgh, Pa.

Westinghouse

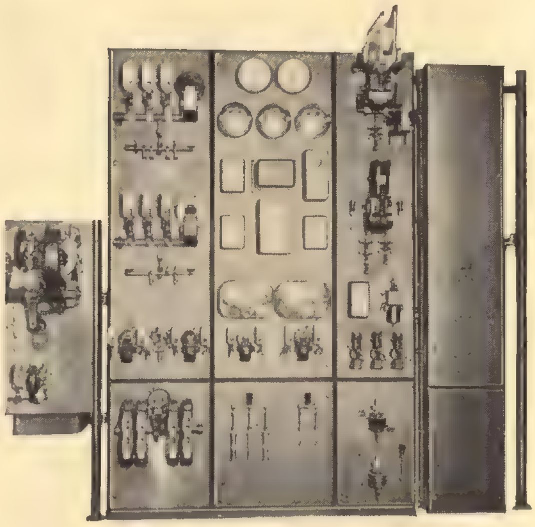
1922 A.E.R.A. Exhibit Features

Westinghouse 300-kw. Substation Equipment exhibited includes a synchronous converter and the requisite switching apparatus.

New features of this equipment include the removal of current limiting resistances, as well as changes in design tending to improve the appearance, and provide a more positive functioning.



Westinghouse Self-Starting Synchronous Converter, 300-kw., 60-cycle, 6-phase, 600-volts, D.C.



Automatic Switchboard for 300-kw., 60-cycle, 6-phase, 600-volt, D.C., Self-Starting Synchronous Converter.

The converter is connected to the trolley through a high-speed contactor which is furnished with a current transformer trip, thus the breaker opens only upon the occasion of a short circuit. After this contactor opens, circuits are set up to measure the resistance of the trolley section. When the short circuit is removed, or the resistance raises to a pre-determined value, the high-speed contactor again closes.

Westinghouse Electric & Manufacturing Co.,
East Pittsburgh, Pa.

Westinghouse

1922 A.E.R.A. Exhibit Features

ELECTRIC SERVICE SUPPLIES CO.
MANUFACTURERS OF RAILWAY MATERIAL AND ELECTRICAL SUPPLIES

ELECTRIC SERVICE
SUPPLIES COMPANY

Philadelphia
New York
Scranton
Chicago
Boston
Pittsburgh

two of the
Keystone Car
Specialties featured
in our exhibit
in Section D,
Booths 15, 16, 17, 18.

See other Advertisement on pages 10, 11 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

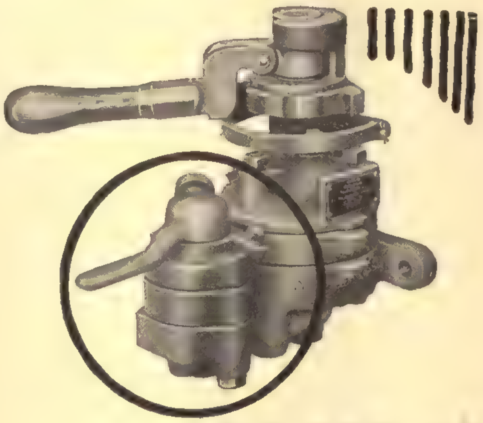
SAFETY CAR DEVICES CO.

Door Selector Valve

In operating double-passageway Safety Cars, why throw *both* doors open at *every stop?*

The new Selector Valve of the Safety Car Devices Company obsoletes this practice and adds greatly to the advantages of double-door operation by providing a quick, easy means of independent door control for entrance only, exit only, or both at once, as occasion requires.

Independent door control is a valuable aid to the motorman in regulating the flow of passengers in such manner as he deems best suited to the conditions of one-man operation.



The New SELECTOR VALVE as Incorporated in the Pipe Bracket of the Standard M-28 Safety Car Brake Valve.

Showing Correct and Convenient Method of Passenger Interchange with Independent Door Control as Provided by the New SELECTOR VALVE.

And in cold weather especially, a material saving in heat, as well as better protection for passengers, will result from a system which makes it unnecessary to open both doors at every stop.

We furnish the Air Brake and Safety Car Control Equipment which is the fundamental characteristic of the Safety Car!

SAFETY CAR DEVICES CO.
of St. Louis
Postal and Telegraphic Address:
WILMERDING, PA.

1922 A.E.R.A. Exhibit Features

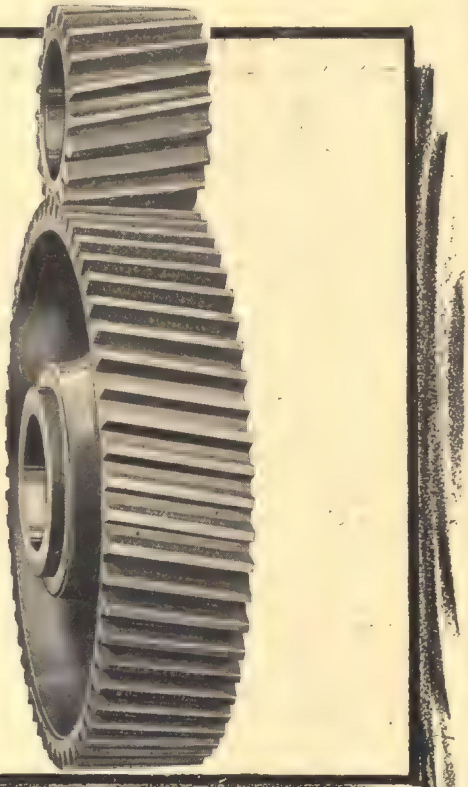
Old Number One

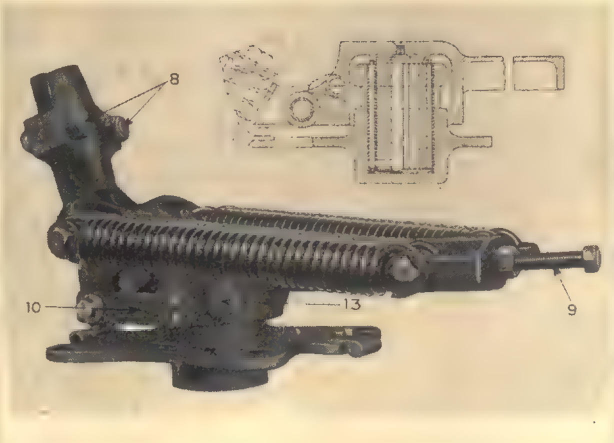
After seven and one-half years' service, 445,423 car miles is again one of the features at the Nuttall Exhibit in Section A.

Average tooth wear of Pinion .064-in.

Average tooth wear of Gear .041-in.

The pressing need for economy in car maintenance makes the Nuttall standard 7½ deg. Helical the logical gear for Railway service.





The last word in Trolley Bases Nuttall U.S.-13 E

Dust-proof Water-proof Leak-proof Fool-proof

Nuttall reversed the usual design—put the pin on the swivel and the cap bearing in the foot. Oil cannot escape—dust cannot get in. Many other features including hardened renewable bushings at all wearing parts. Don't fail to see it, and see it in operation.

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

1922 A.E.R.A. Exhibit Features

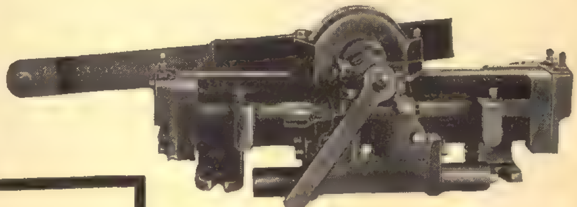
CONSOLIDATED

Motorman's Starting Lights

Pneumatic Door Engines

A visit to our Booths 11-12-13 will enable us to demonstrate to you features of safety, economy and flexibility of operation not possessed by any simular device.

Motorman's Signal Light


Pneumatic Door Engine

Cross Seat Type Elec. Heater

CONSOLIDATED

Electric Heaters with Thermostatic Control

You will be shown not only our standard types but also newly designed, fully-enclosed, waterproof heating elements and something brand new in a thermostat.

Consolidated
Car Heating Co.
Albany
New York **Chicago**

1922 A.E.R.A. Exhibit Features

More-Jones Brass & Metal Co.

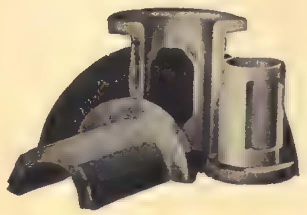
In Booths No. 9-10, Sec. D there is an exhibit of More-Jones Quality products.

The newest and most practical ideas, that intelligent experiment and exhaustive tests have shown will lead to greater efficiency, are incorporated into these products.

The engineers in charge will be glad to show you wherein lies the superiority of More-Jones V-K Oilless Trolley Wheels, "Tiger" Bronze Axle and Armature Bearings and M. J. Armature Babbitt.

See this Exhibit

"TIGER"



BRONZE

Oilless Trolley Wheels and Non-Arcing Harps

Use them for perfect lubrication, maximum conductivity and long wear.

"TIGER" Bronze, Axle and Armature Bearings

If you believe that ultimate cost is the only true measure of economy, standardize on "Tiger" Bronze Bearings.

M.-J. Armature Babbitt

Proven best and cheapest in the long run.

Saves time, labor and materials in rebabbitting bearings.

See other advertisement on page 104, 105 Electric Railway Journal Convention Report Number, October 7.

1922 A.E.R.A. Exhibit Features

HALE & KILBURN

Exhibit Car Seats for every class of service. Accompanying illustration shows a standard high-grade *Interurban Steel Seat.*

Steel Aisle Ends
Drawn Steel Pedestal
Single Automatic Foot Rest
Soft Spring Detachable Cushion and Back
Plush, Rattan or Other Covering

Reasonable Price

No. 300 EE Plush

No. 400 Rattan

Standard Light-weight

All-Steel Car Seat

Neat—Strong—Simple—Comfortable

Made with or without springs
Covered with rattan or other materials

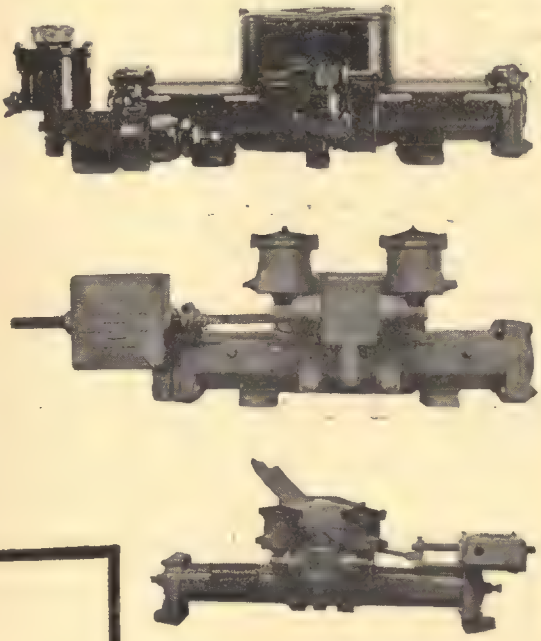
Hale & Kilburn Corporation
American Motor Body Co., Successor
Philadelphia

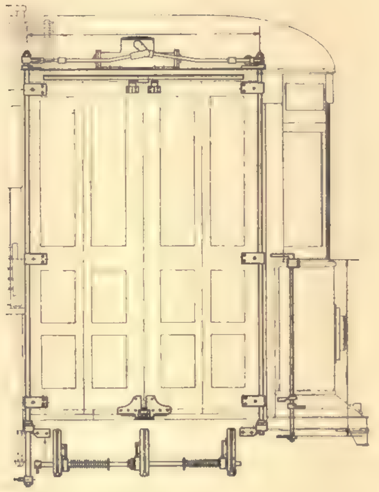
See other Advertisement on page 88 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

National
Pneumatic
Accident Preventers
and Time Savers

Door Operating
Engines for every
type of door





Standard door-operating
mechanism in use
on thousands of cars

National Pneumatic Co.
Incorporated
50 Church St., New York
McCormick Bldg., Chicago
Works: Rahway, N. J.

See other Advertisement on page 13 of the Electric Railway Journal Convention Report Number, Oct. 7.

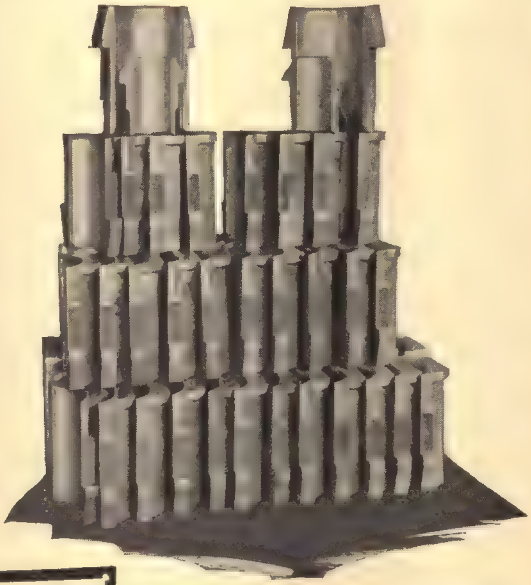
1922 A.E.R.A. Exhibit Features

ULCO BRAND FRARY METAL

Journal Bearings

The "one-metal" bearing, eliminating bonding trouble and re-babbitting expense.

Section E—Booth 67



ULCO BRAND FRARY METAL

Motor Axle Bearings

for longer mileage with lower lubricating cost. No scored axles.

Section E—Booth 67

United Lead Company
111 Broadway, New York

1922 A.E.R.A. Exhibit Features

Meter the Energy— That's What You Want to Save

This simple, rugged, energy-measuring meter shows the motormen and the management in clear figures the actual car energy consumption. It enables the management to save from ⅓ to ½ cent per car mile. That's why more than 100 roads have adopted Economy Meters for power saving and car inspection purposes. See our exhibit on the pier.

ECONOMY Meter with Power-Saving and Car Inspection Dials

Aluminum

Field Coils

Look At These Coils

There is every possible reason for using them. They are 50 to 60% lighter in weight—they are insulated by the oxide process and are less affected by heat and moisture. Minimum terminal trouble, less chafing and less renewals. The first cost is attractive. By all means see the various types and cross sections on exhibit.

Economy Electric Devices Company

L. E. Gould, Pres., Old Colony Bldg.
Chicago

National Railway Appliance Co., New York
L. A. Nott, San Francisco
Burton R. Stare Co., Seattle
Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis
Detroit Railway Supply Co.
Alfred Collyer & Co., Montreal, Quebec

Cable address: Sangamo, Chicago

1922 A.E.R.A. Exhibit Features

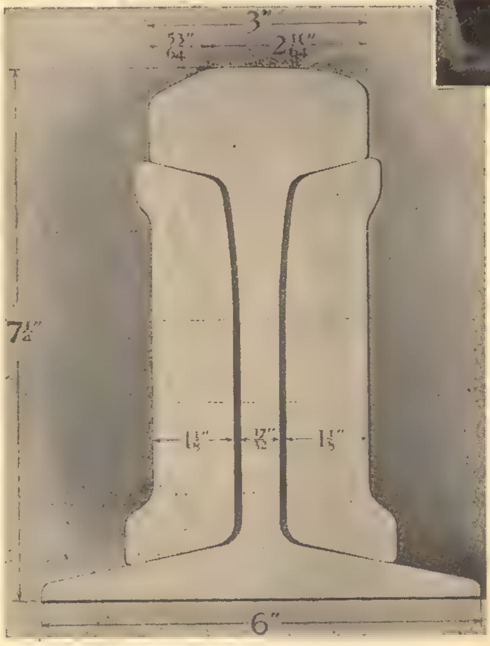
The Lorain Steel Company

General Offices:
Johnstown, Penna.

SALES OFFICES:

Atlanta	New York
Chicago	Philadelphia
Cleveland	Pittsburgh
Los Angeles	San Francisco
Portland	Seattle

LORAIN
Electrically Welded
JOINTS
forge the steel while the weld is being made



Girder Rails
Guard Rails
Special Trackwork

See other Advertisement on page 23 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

Bates Steel Poles

The material from which they are made and the method of manufacture of Bates Expanded Steel Poles give them the strength, and long life, that distinguish them from all other types of poles.

Bates Expanded Steel Truss Co.
208 South La Salle St.
Chicago

The advantages of Bates line construction and the reasons for its economy are being shown at our exhibit on the Pier. Be sure to visit this exhibit during the Convention.

See other Advertisement on page 17 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

EVERY A. E. R. A. Convention that has had exhibits has had an O-B Exhibit where railway men have always found a cordial welcome and some interesting samples to examine.

This year is no exception and in Spaces 1-6, Section D, The Ohio Brass Company is showing a representative line of materials, including a great many new and improved devices.

But you needn't wait for convention time to see O-B Materials. There are permanent "exhibits" nearly everywhere that trolley lines run. O-B Trolley Material, Rail Bonds, Car Equipment and High Tension Porcelain Insulators are giving working demonstrations every day in the year and in every class of service. Even the most recent development in the industry—trackless trolley—finds that O-B Trolley Material, Current Collection Devices and other Equipment Specialties help make operation practical.

See other Advertisement on page 7 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

"Steel Twin Tie Track Construction"

is a motion picture film on track construction methods made in Cleveland, Toledo and Baltimore.

Novel methods, special equipment and the best construction practice with steel ties in paved work are shown in interesting, snappy style.

It would take a week of your time and cost a hundred dollars to go to these cities to see the same thing.

Executives, engineers and track men should not miss it when attending the Convention. It will be shown continuously on three projectors at Booths 13 and 14, Section D, Municipal Pier.

THE INTERNATIONAL STEEL TIE COMPANY
Cleveland

After the Show

this film will be available for showing either at your office by our representative or by arrangement with your local moving picture house.

A special print, titled "TRACK MAKES CITIES GROW" will be available for publicity purposes. Write our advertising department or call at our Booth Spaces 13 and 14, Section D.

THE INTERNATIONAL STEEL TIE CO.
Cleveland

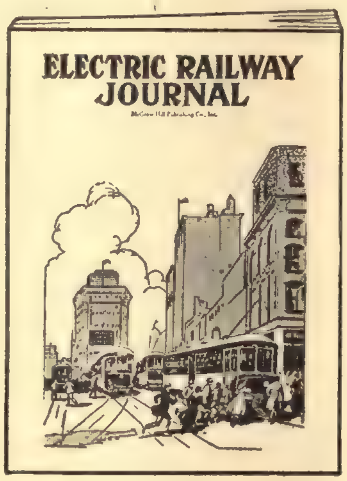
See other Advertisement on page 9 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

Electric Railway Journal

On the Municipal Pier,
Section B, Spaces 41, 42, 43.

To serve the
electric railway industry.



DECATUR, 43,818
(See also No. 233.)

196—Decatur Ry. & Lt. Co.—Office. 124 S. Water St. (Controlled by Danville, Champaign & Decatur Ry. & Lt. Co.) (Part of Illinois Trac. System.)
Pres. Wm. B. McKinley...Champaign
V. Pres. Exec. H. E. Chubbuck. Peoria
V. Pres., Treas.,
Geo. M. Mattis........Champaign
Gen. Audr. B. E. Bramble. Champaign
Gen. Mgr. M. L. Harry......Decatur
Supt. Transp. P. J. Brilley...Decatur
Pur. Agt. H. J. Vance........Peoria
Claim Agt. H. C. White......Decatur
Ch. Engr. G. W. Doerr......Decatur
M. M. C. H. Woods.........Decatur
Engr. Ovhd. Constr.
D. J. White..............Decatur

Power. sta. equip. 2 d. c. Allis-C., G. E. tot. 1300 kw.; 3 a. c. Allis-C., West., G. E. tot. 3500 kw., 2300 v., 3 ph., 60 cys.; 5750 hp. e. H. O. & R., Allis-C.; 4700 hp. b. Bab. & W. Stirling.

Power sta. at Edward & Cerro Gordo Sts. Repair shops at 400 E. Wood St.

15.64 miles (14.89 mi. 1st m. t., 0.75 mi. 2nd m. t.); also 3.75 miles leased. Total miles operated 19.37; 4-8½ g; 39 motor pass. and 2 motor service cars. (Company does general lighting and power business.) *62 S

Specimen Item.

McGraw Electric Railway Directory

Complete data on the personnel and equipment of every electric railway property in America — Issued Semi-Annually.

1922 A.E.R.A. Exhibit Features

TRADE ST. LOUIS SURFACER SPECIALTIES MARK

Booth E-66

When you call at Booth E-66 to see the exhibit of St. Louis Surfacer Specialties, ask for these four booklets:—

Surpaco Railway Varnishes—Outside Finishing, Railway Rubbing, Inside Finishing and Cane Seat Varnishes.

St. Louis Surfacer System—Description and directions for applying.

Canvas Preserver and Canvas Roof Paint—Description and method of application.

Surnamel; Steel and Wood Car Enamel System—Description and directions for applying.

Also be sure to see the samples of the various St. Louis Surfacer specialties. The representatives in charge of the exhibit have all had long experience in railway painting and finishing and will be glad to answer all questions.

St. Louis Surfacer & Paint Co.
Arlington Ave.
and Terminal Belt Line
St. Louis, Mo.

See other Advertisement on page 87 of the Electric Railway Journal Convention Report Number, Oct. 7.

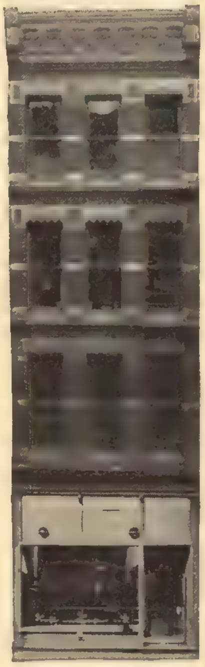
1922 A.E.R.A. Exhibit Features

Electric Railway Equipment Co.

2900 to 2918 Cormany Ave.,
Cincinnati, O.

A large part of the overhead material shown in this new catalog will be found on display at our Booth 71 E. This entire line has been revised recently to comply with A.E.R.A. Standards and best modern practices. See also models of Elreco. Combination Railway and Lighting Poles which are used in over 70 progressive cities.

We welcome a call from you and will be pleased to furnish any engineering information or catalogs desired.



THE ELECTRICAL MATERIAL COMPANY are Sales Agents for the products of the Electric Railway Equipment Co., including the famous line of Elreco combination Railway and Lighting Poles.

Depend upon us for any standard electrical supplies. Our service is prompt, efficient and courteous. We ship from Chicago stocks.

Electrical Material Co.
158 West Lake Street, Chicago, Ill.

1922 A.E.R.A. Exhibit Features

BUDA
ESTABLISHED
1881

Clark and Randolph Streets (Hotel Sherman Corner), Chicago. Installed March, 1918.

Inspect this layout while in Chicago and note traffic conditions.

Frog removed from Madison and State Streets, Chicago. More than nine million loaded car wheels operated over this frog before removal.

Note wear of rail and manganese, and center is still tight.

The Buda Company
Harvey (Chicago Suburb) **Illinois**

See our Exhibit Section B,
Spaces 44, 45 and 46

1922 A.E.R.A. Exhibit Features

Accidents Will Happen!

"For such injuries as do happen in spite of well-regulated accident prevention activities, it is essential that adequate First Aid equipment be provided."

—*Report of Natl. Electric Light Assn.* 1921.

Compact Emergency Dressing Kit No. 24

List of Customers

Western Electric Company
Central Hudson Gas & Electric Co.
Central Mass. Electric Co.
Citizens Traction Co.
Consumers Power Co.
Carnegie Steel Co.
Long Island Lighting Co.
Marlborough Electric Company
Postal Telegraph Cable Co.
Salem Electric Lighting Co.
Standard Oil Company of N. J.
Wayne Electric Light & Power Co.

The illustration shows a kit especially suitable for the use of line crews and repair gangs.

First Aid
Specialty Company, Inc.
34 Hubert Street, New York

See exhibit in Section F—
Booth 41.

1922 A.E.R.A. Exhibit Features

Report of Investigation of

"INDIANAPOLIS"

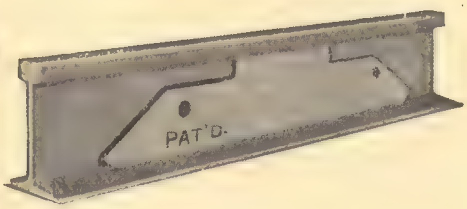
Type of

Welded Rail Joints

They Meet All Requirements

To Wit as Follows:—

1. **Conductivety**—138%—United States Bureau of Standard Test.
2. **Strength**—Over 100%—Robt. W. Hunt & Co., Testing Laboratories.
3. **Endurance**—11 Years in Service—Still Intact.
4. **Dependable**—Less than 1% Failure. When installed as directed by Manufacturer.
5. **Economical**—Cost Less Than Bolted and Bonded Joints.
6. **Available**—Any road. Any quantity—from one (1) to Ten Thousand (10,000).
7. **Universal**—In use on over 125 Different Rail Sections.
8. **Endorsed**—In use on over 200 Properties.



WHY?

Because—

They are Scientifically Designed A Special Product for a Specific Purpose

Completely and Perfectly Effecting the

"CONTINUOUS RAIL"

"Perfection in Principle Proven in Performance"

**Indianapolis
Switch and Frog
Company
Springfield, Ohio**

Municipal Pier—Space E-63

1922 A.E.R.A. Exhibit Features

Delegates to the Convention
are cordially invited to
Booth 68
Section "F"
Boyerized Hard Stuff
is on exhibition there
Cordially –
Warren L. Boyer.

Boyerized

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

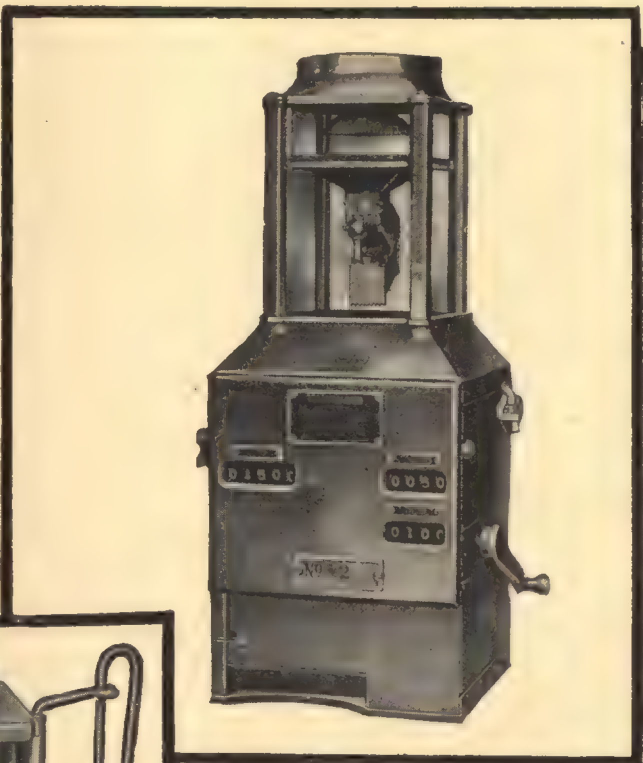
Bemis Car Truck Co.,
SPRINGFIELD, MASS.

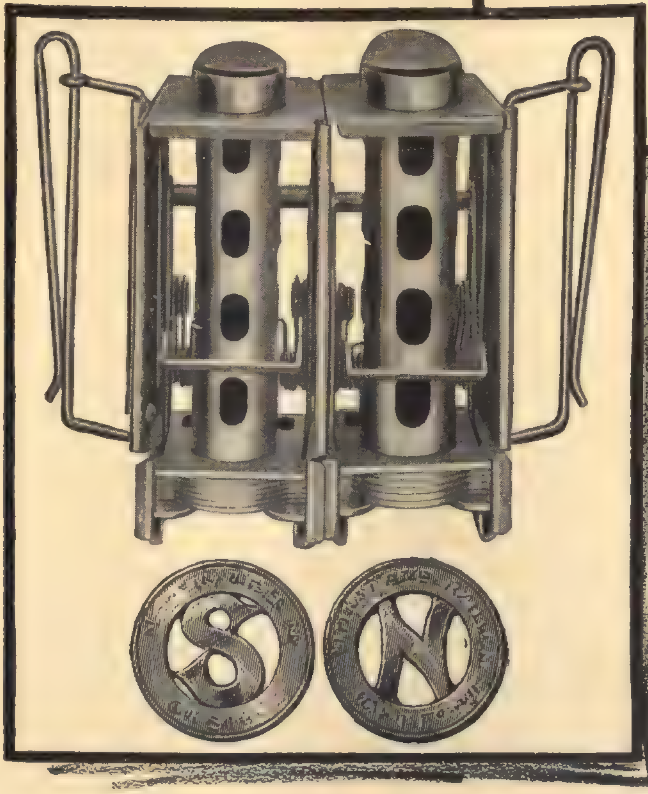
REPRESENTATIVES:
Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill. F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal. J. H. Denton, 1328 Broadway, New York City, N. Y. W. F. McKenney, 54 First St., Portland, Oregon. A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

1922 A.E.R.A. Exhibit Features

JOHNSON Fare Boxes

Johnson Registering Fare Boxes will put cash into the treasury that would never have gotten there otherwise. They increase revenue from 3% to 10%, insure better maintenance of schedules by making faster loading certain, and promote better relations with the riding public. See the announcement of the new Johnson Fare Box in the September 23rd issue of *Electric Railway Journal.*





JOHNSON

Universal Changers and Metal Tokens

Operating Companies everywhere have adopted Johnson Universal Changers as standard equipment for conductors. They make for faster loading, better public relations, and improved morale. Johnson Metal Tokens when used in connection with Johnson Fare Boxes provide the ideal system of fare collection where more than one coin is necessary for fare.

See our other Advertisements on pages 168, 169 of the Sept. 23rd issue of Electric Railway Journal.

1922 A.E.R.A. Exhibit Features

MILLER Trolley Shoes

(Patented)

—meet every requirement for increased efficiency.

1. The pantagraph applied to the trolley car.
2. Better current collector.
3. FEWER DEWIREMENTS.
4. Noiseless.
5. No lubrication.
6. Less wear in trolley wire.
7. More miles per dollar.

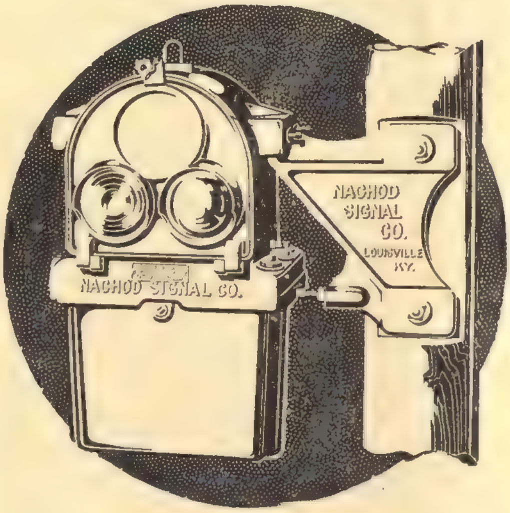
EXHIBITED BY

Economy Electric Devices Co.

Booths 17, 18—Section F

MILLER TROLLEY SHOE COMPANY

Boston-21, Mass.


NACHOD SIGNAL CO. LOUISVILLE KY.
NACHOD SIGNAL CO.

NACHOD SIGNALS are displayed by means of track plans and miniature cars. Push the car over the track and observe the signal operation. Nachod Signals tell the motorman when the block is clear to the next passing siding, show him when he takes the block that he has stopped an opposing car, permit other cars to follow him thru the block, notifying them that the block is occupied, and give each an indication of protection when entering, meanwhile holding Stop Signals at the other end until the block is again clear.

Highway Crossing Signals and Automatic Headway Recorder are also displayed in operation.

Booth 12. Section C.

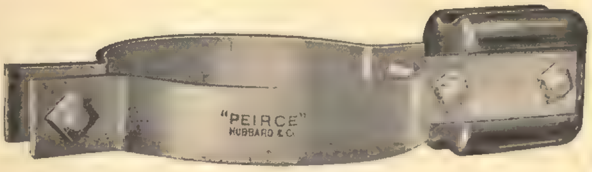
Nachod Signal Co., Inc.

Louisville, Ky.

1922 A.E.R.A. Exhibit Features

HUBBARD
Pole Bands

Space
B-15 and 16



The Hubbard Insulated Pole Band

Furnished with or without insulators for all standard sizes of poles.

The Hubbard Pole Band

with Pull-Off Rod, which eliminates the necessity of using more than one band on a pole.

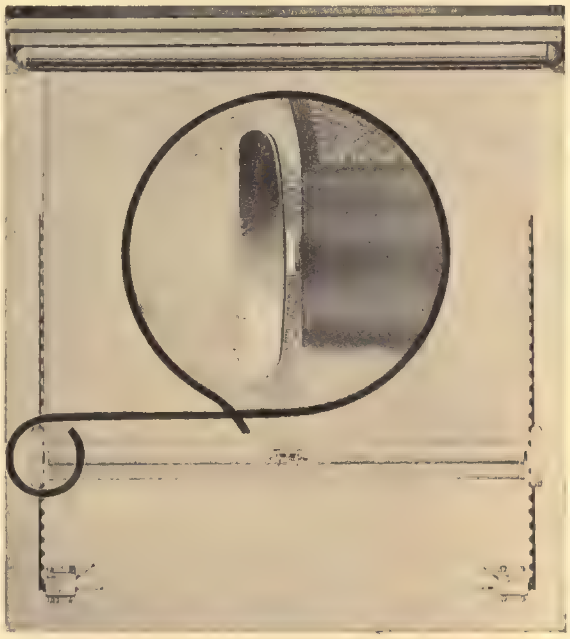
Hubbard & Co.
Pittsburgh, Pa.

See other Advertisement on page 110 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

KASS Safety Treads absolutely prevent slippage and reduce the likelihood of accidents to a minimum—that's why engineers generally agree that it is good safety-first practice to use them not only on car steps but on all other steps used by the public. If you are attending the show see our exhibit; if not, ask for our special Bulletin No. 6.

Window Curtains and Fixtures



ACME
Car Appliances

We will also have on exhibit a complete line of railway car appliances, all of the latest and most generally approved designs.

We specially call your attention to our line of weatherproof windows and fixtures and our car window curtains and fixtures.

MORTON MANUFACTURING COMPANY
325 No. Leamington Ave.
Chicago, U. S. A.

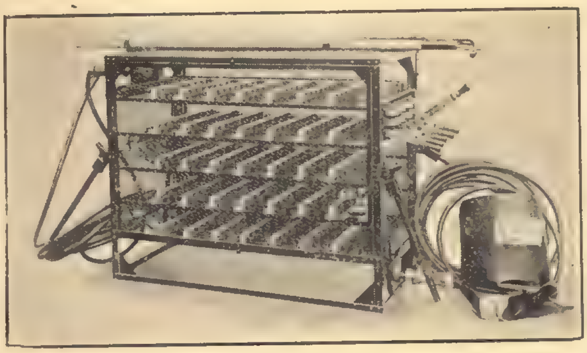
1922 A.E.R.A. Exhibit Features

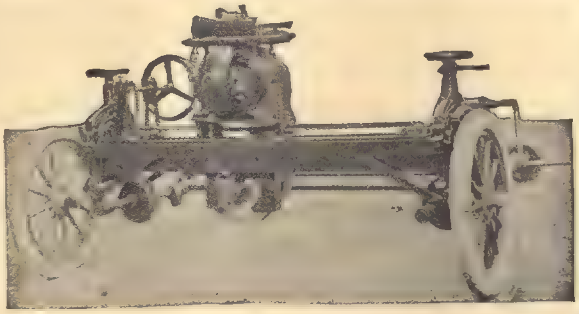
"AJAX"
Electric Arc Welder

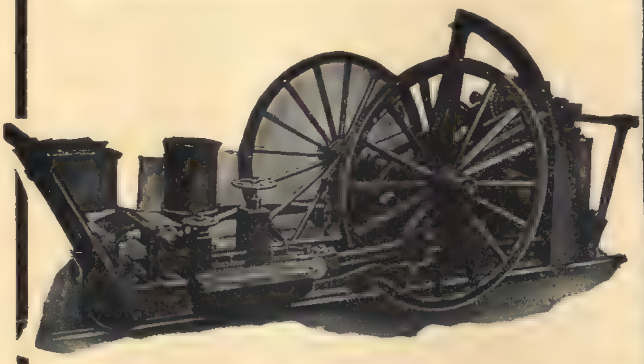
Well worth your careful inspection. A 155-lb. portable electric arc welder of highest capacity. Exhibited and demonstrated at

Booth 23-24, Section B.

Railway Track-work Co.,
Philadelphia, Pa.







A Complete Line of

Track Grinders

"UNIVERSAL"
Rotary Track Grinder
"ATLAS" Rail Grinder
"RECIPROCATING"
Track Grinder

Booths 23-24, Section B

Railway Track-work Co.
Philadelphia, Pa.

See other Advertisement on page 18 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

Our latest type R-11 double register arranged for electric operation. This register will be shown at our exhibit, space 55, section F.

The International Register Company
15 South Throop St.
Chicago

General selling agents for
HEEREN ENAMEL BADGES

Type R-11
Double Register

Type R-10—Single Register

We shall also show an R-10 single register with the new electrically operated back.

See other Advertisement on page 123 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

White Busses

At the White Company exhibit will be found motor busses of the type being adopted by representative electric railways throughout the country.

White Model 50 Bus in the Service of the Northern Ohio Traction & Light Co.

Northern Ohio Traction & Light Co.

Buys 19 White Busses

The Northern Ohio Traction & Light Co. is one of the many electric railways to install White Busses for extending service. Following an order for three White Model 50 Busses the company purchased 16 additional Whites for service in Akron and Canton, Ohio. Another large user of White Busses is The Milwaukee Electric Railway & Light Co., with a fleet of 32.

A few of the other well-known electric railways operating White Busses are:

The Pennsylvania-Ohio Electric Co.
United Electric Railways Co. of Providence
Chicago, North Shore and Milwaukee Railroad
Washington Railway & Electric Co.
Municipal Railway of San Francisco
Rockford & Interurban Railway
Tulsa Street Railway Co.
The Connecticut Co.
United Railways & Electric Co. of Baltimore

1922 A.E.R.A. Exhibit Features

McGraw-Hill Publications

on the
Municipal
Pier
at the
Convention

The cross-roads of inquiry and information

—a symbol of the service of McGraw-Hill Publications to the Engineer and to Industry.

Electric Railway Journal
Bus Transportation
Engineering News-Record
Engineering and Mining Journal-Press
Industrial Engineer
Coal Age
Power
Electrical World
Chemical and Metallurgical Engineer
Journal of Electricity and Western Industry
Electrical Merchandising
Ingenieria Internacional
American Machinist
American Machinist—European

IF YOU are not already a regular reader of the McGraw-Hill Publication which serves your industry, send for a sample copy.

Promotion Department
McGraw-Hill Company, Inc.
Tenth Avenue at 36th Street
NEW YORK

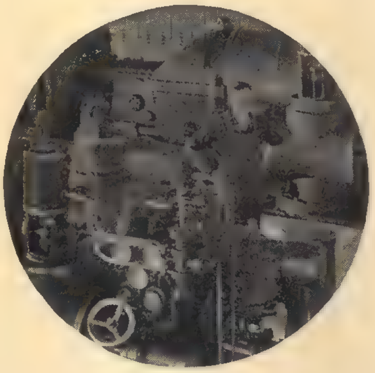
1922 A.E.R.A. Exhibit Features

GALENA LUBRICATION

For Rolling Stock

True economy requires choice of proper lubricants as well as proper methods of application to eliminate waste and still avoid burnt out bearings. Let us show you how Galena Service will secure maximum economy on your road.

Convention Exhibit
Section B
Booth 1—2—3—4—5—6



GALENA LUBRICATION

For Power Plant

Galena experts are always at your service to discuss and analyze problems of economical lubrication of modern turbo-generating equipment.

Convention Exhibit
Section B
Booth 1—2—3—4—5—6

See other Advertisement on page 33 of the Electric Railway Journal Convention Report Number, Oct. 7.

1922 A.E.R.A. Exhibit Features

G-E Equipment at the Convention

GE-264, GE-265, GE-275 and GE-255 Motors
Type PC and Type K Control
Complete Control Equipment for Trolley Buses
Motor and Controller Renewal Parts
Line Breaker Equipment for Safety Cars
CP-26 and CP-29 Air Compressors
Synchronizing Governor Equipment
Motorman's Valves
Stationary Air Compressors
Type AW Resistor Arc Welder and accessories for bond welding
Railway Line Material and Rail Bonds
Sectionalizing Switch
A-C Reclosing Feeder Equipment
Turnstiles for subway and elevated stations

Supervisory control for automatic stations, a new G-E development, is in operation at the North Chicago, Ravinia and Lake Bluff substations of the Chicago, North Shore and Milwaukee Railroad; also a 1000-kw. automatic, 60-cycle, 600-volt rotary converter equipment at Ravinia. It has been arranged to have a special North Shore train to take interested visitors to these points to see this equipment in operation.

General Electric Company

General Office
Schenectady, N.Y

Sales Offices in
all large cities

25-169

Send For These Valuable Booklets

If you did not get these St. Louis Surfacer Specialty Booklets at the Chicago Convention, send for your set now.

Railway Varnishes

A list of the principal Surpaco Railway Varnishes, Japan Dryers and Reducing Oils.

St. Louis Surfacer System

A description of this famous Surfacer System—adaptable on both old and new work—together with directions for use on steel and wood coaches.

Canvas Preserver and Canvas Roof Paint

Outlines the essential features of St. Louis Surfacer Canvas Roof Preserver and Roof Paint and describes a convincing test to demonstrate the wonderful values of these Surfacer specialties.

Surnamel

Includes a consideration of this steel and wood car enamel system and complete directions for its use on both old and new work.

Add these booklets to your paint library—they are really worth while because they describe a portion of the St. Louis Surfacer specialties which have been in favorable use by the electric railway industry for many years.

ST. LOUIS SURFACER & PAINT CO.
Arlington Ave. and Terminal Belt Line, St. Louis, Mo.

Hale and Kilburn SEATS

Standard Interurban Steel Seat

If—

all the Hale & Kilburn Seats installed in railway cars throughout the world today were suddenly removed you'd be astonished at the number of miles you'll ride without sitting down. Hundreds and hundreds of cars would be offering "STANDING ROOM ONLY."

This world-wide popularity of H & K Seats is due to nearly 40 years of knowing how to build the kind of seats that meet the combined approval of operators and riders. Every H & K Seat is made as comfortable for the rider as it is made economical for the operator.

Steel Seat Light Weight

Lightest, Strongest, Simplest, Neatest

Lightest Weight Stationary Steel Seat

Lightest Weight Walkover Steel Seat

Hale & Kilburn Corporation

American Motor Body Co., Successors

Works: PHILADELPHIA

NEW YORK
30 Church St.

CHICAGO
McCormick Bldg.

WASHINGTON
Munsey Bldg.

ATLANTA
Candler Bldg.

FRISCO
71 First St.

New One Man Cars for Chicago Surface Lines have

ROOF HASKELITE PANELS

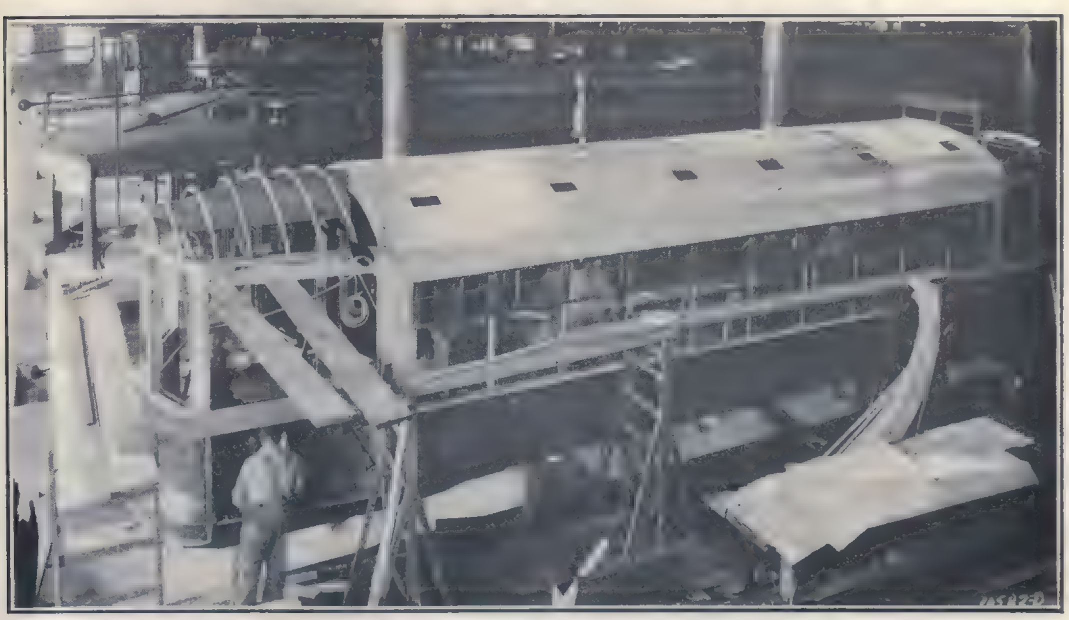
The first car of the forty-five double truck one-man cars now building for the Chicago Surface Lines is shown here. The HASKELITE Roof Panels can be seen in the lower photograph. HASKELITE was used in headlinings, headers and wainscoting.

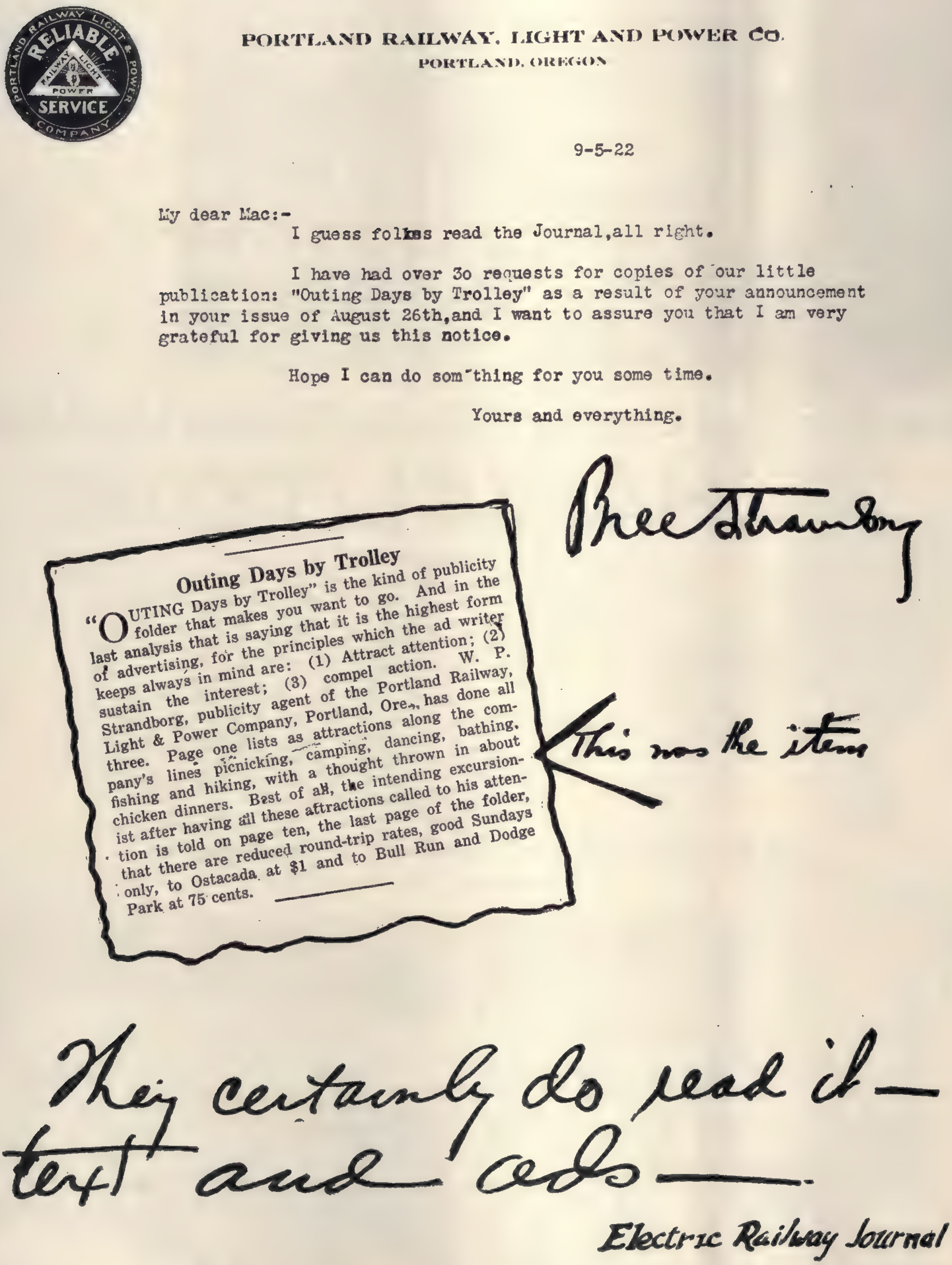
The body roof of four sections was put on and trimmed complete in *five hours* by three men. Laying a poplar tongue and grooved roof of this car would have required ten hours labor with the same number of men.

HASKELITE roof panels, besides being easy to handle and apply have many other advantages. They are light in weight, have unusual strength and are absolutely permanent. The smooth surface makes finishing rapid and economical.

The combination of HASKELITE strength, permanence, and low cost is the reason for its wide use in car construction. Our engineering department will gladly supply any required data. *Ask also about PLYMETL for sides and for buses.*

Haskelite Manufacturing Corporation
133 W. Washington St., Chicago, Ill.





PORTLAND RAILWAY, LIGHT AND POWER CO.
PORTLAND, OREGON

9-5-22

My dear Mac:-

I guess folks read the Journal, all right.

I have had over 3o requests for copies of our little publication: "Outing Days by Trolley" as a result of your announcement in your issue of August 26th, and I want to assure you that I am very grateful for giving us this notice.

Hope I can do som'thing for you some time.

Yours and everything.

Bree Strandborg

Outing Days by Trolley

"OUTING Days by Trolley" is the kind of publicity folder that makes you want to go. And in the last analysis that is saying that it is the highest form of advertising, for the principles which the ad writer keeps always in mind are: (1) Attract attention; (2) sustain the interest; (3) compel action. W. P. Strandborg, publicity agent of the Portland Railway, Light & Power Company, Portland, Ore., has done all three. Page one lists as attractions along the company's lines picnicking, camping, dancing, bathing, fishing and hiking, with a thought thrown in about chicken dinners. Best of all, the intending excursionist after having all these attractions called to his attention is told on page ten, the last page of the folder, that there are reduced round-trip rates, good Sundays only, to Ostacada at $1 and to Bull Run and Dodge Park at 75 cents.

This was the item

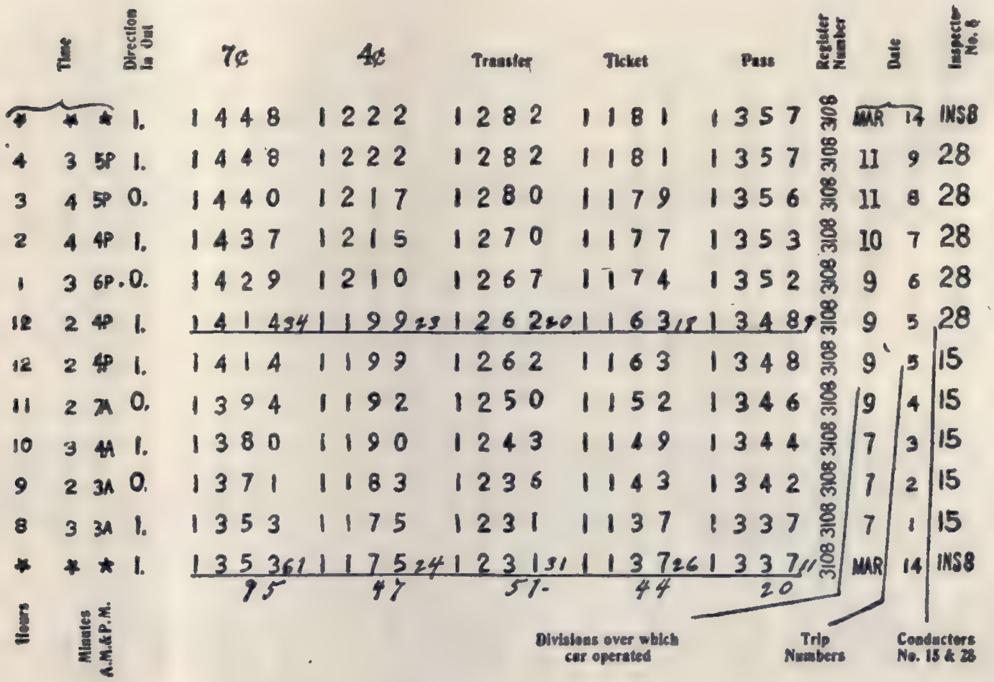
They certainly do read it—
text and ads—

Electric Railway Journal

Play Safe with Transportation Sales

There are certain methods of selling commodities by retail which are recognized as essential to success by the merchant. The Ohmer Fare Register applies these methods to the sale of Electric Railway Transportation.

Each sale is controlled by a clear indication and registration of the amount. The Ohmer System operates in accordance with the most approved merchandising principles.



Time			Direction In Out	7¢	4¢	Transfer	Ticket	Pass	Register Number	Date		Inspector No. 8
*	*	*	I.	1448	1222	1282	1181	1357	3108	MAR	14	INS8
4	3	5P	I.	1448	1222	1282	1181	1357	3108	11	9	28
3	4	5P	O.	1440	1217	1280	1179	1356	3108	11	8	28
2	4	4P	I.	1437	1215	1270	1177	1353	3108	10	7	28
1	3	6P.	O.	1429	1210	1267	1174	1352	3108	9	6	28
12	2	4P	I.	1414 34	1199 23	1262 20	1163 18	1348 9	3108	9	5	28
12	2	4P	I.	1414	1199	1262	1163	1348	3108	9	5	15
11	2	7A	O.	1394	1192	1250	1152	1346	3108	9	4	15
10	3	4A	I.	1380	1190	1243	1149	1344	3108	7	3	15
9	2	3A	O.	1371	1183	1236	1143	1342	3108	7	2	15
8	3	3A	I.	1353	1175	1231	1137	1337	3108	7	1	15
*	*	*	I.	1353 61	1175 24	1231 31	1137 26	1337 11	3108	MAR	14	INS8
				95	47	51-	44	20				

Hours

Minutes A.M.&P.M.

Divisions over which car operated

Trip Numbers

Conductors No. 15 & 28

OHMER FARE REGISTER CO.

Dayton, Ohio

Car Comfort
with
Utility Heaters Regulators Ventilators
Maintains Uniform Temperature
15

RAILWAY UTILITY COMPANY

141-151 W. 22nd St., Chicago, Ill.

J. H. Denton, 1328 Broadway, New York

F. S. McNamara, 307 Barth Bldg., Denver

Detroit Railway Supply Co., 351 Equity Bldg., Detroit

PANTASOTE
TRADE MARK

AGASOTE
TRADE MARK

Standards
for
Electric
Railways

THE PANTASOTE COMPANY
NEW YORK CHICAGO SAN FRANCISCO

BETTER THAN EVER

Accurate Bearings From Perfect Alloy Result in Longer Mileage At Less Cost

The product of years of experience in alloying metals for bearing purposes.

Cut the cost of motor upkeep with

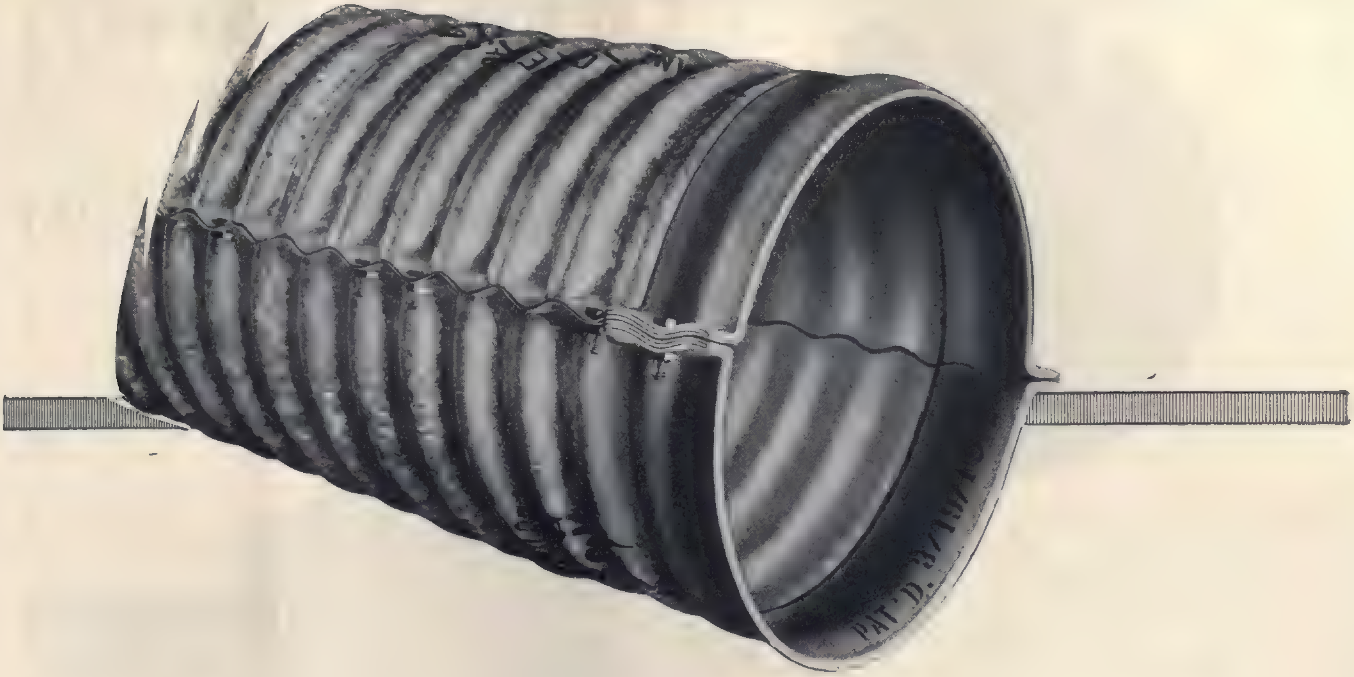
VELOX BRONZE

Armature and Axle Bearings

"C" Grade Nickel Babbitt For Armature Bearings

A. GILBERT & SONS BRASS FOUNDRY CO.

ST. LOUIS, U. S. A.



Under your roadbeds this Fall—

"ACME" (NESTABLE)

TONCAN METAL

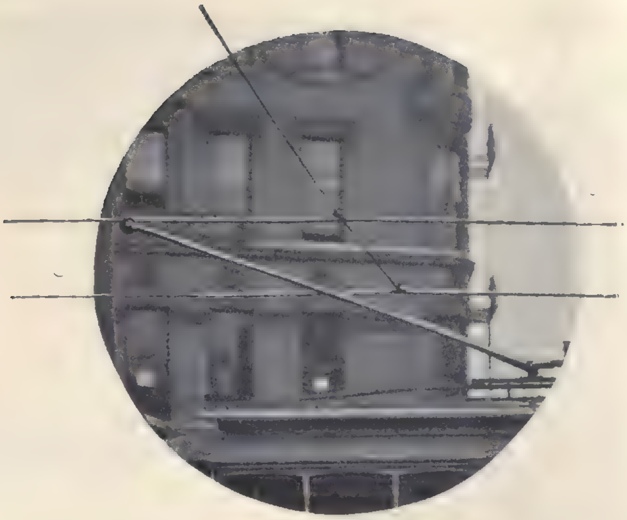
CORRUGATED CULVERTS

Soon cold, sharp winds will blow—snow will fall,—temperatures will drop. At that time it will be a great satisfaction to know that the culverts under your roadbeds are "ACME" (Nestable) Corrugated Culverts. "ACMES" are not affected by freezing. Their nestable construction makes them easy to ship, handle, haul and install and also provides for expansion and contraction. No matter how severe the Winter, Spring will find "ACMES" just the same as when installed. Never any danger of breaking.

Made of anti-corrosive Toncan Metal, "ACMES" serve faithfully season after season. You can bank on them! The many advantages afforded by their nestable construction are clearly outlined in catalog No. 21. Copy will be gladly sent upon request.

We also manufacture "Imperial" Riveted Corrugated Culverts. Write for prices.

THE CANTON CULVERT & SILO CO.
—Manufacturers—
Canton, Ohio



What You Need Here is Good Reliable Flood City Watchmen

Overhead specialties and rail bonds are their own watchmen. Flood City Overhead Specialties and "Everlast" Rail Bonds are the kind of watchmen that are ever on the job reporting "all's well." And "all's well" out on the line means "all's well," on the maintenance cost street.

The entire Flood City staff of electrical experts is at your disposal for improving conditions having to do with Section Insulators, Section Switches, Trolley Wheels, Frogs, Rail Bonds, etc.

Trolley Wheels
Bushings
Bearings
Section Insulators
Section Switches
"Everlast" Rail Bonds

Draft us!

FLOOD CITY MFG. CO.
Johnstown, Pa.

Flood City

RELIABLE BRUSHES

for electric traction

RAILWAY MOTOR BRUSHES
COLUMBIA
203
Grade 203, produced by research and proved by test, the most satisfactory and lowest cost-per-car-mile brush obtainable for A. C. commutator type railway motors. One of a series of standard railway motor brushes.
COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

RAILWAY MOTOR BRUSHES
COLUMBIA
402
Grade 402 has been proved by test the most economical and satisfactory brush for standard slotted commutator railway motors in both city and interurban service. One of a series of standard railway motor brushes.
COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

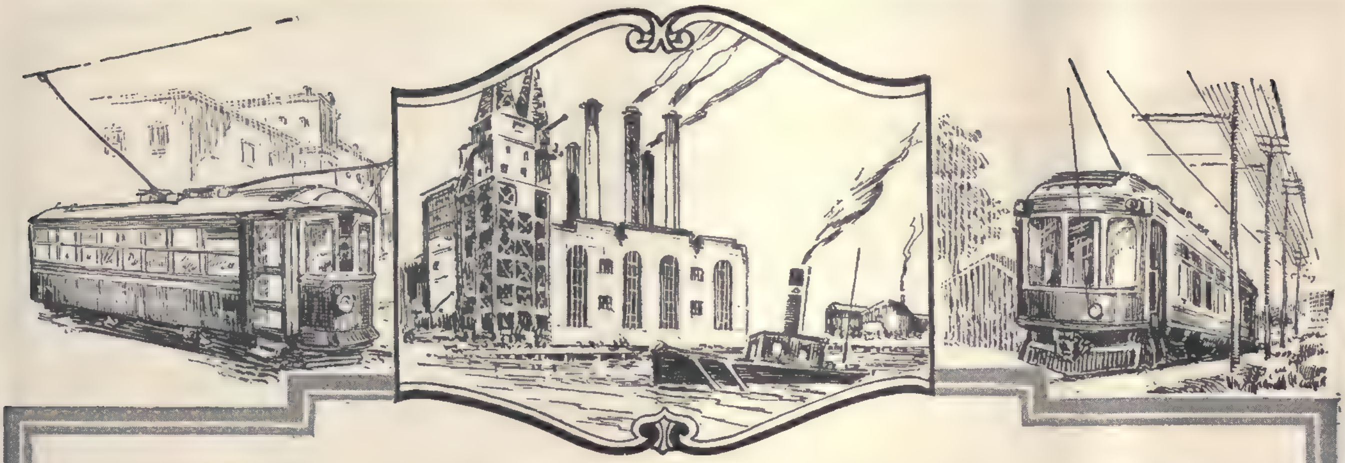
RAILWAY MOTOR BRUSHES
COLUMBIA
812
Grade 812 has been proved by test the most economical and satisfactory brush obtainable for standard flush or slotted commutator railway motors in local or moderate speed interurban service. One of a series of standard railway motor brushes.
COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISC

RAILWAY MOTOR BRUSHES
COLUMBIA
407
Grade 407 is universally recognized and adapted as the premier compressor motor brush on standard railway systems. One of a series of standard railway compressor motor brushes.
COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

For description of our full line of brushes write for Catalogue No. 37

NATIONAL CARBON COMPANY, INC.

Cleveland, Ohio San Francisco, Calif.



MARK TWAIN SAID:

"Everybody talks about the weather, but nobody does anything about it."

May be so in most cases, but Texaco has done something about one phase of it, anyway.

To overcome weather conditions, we manufacture certain of our street railway lubricants in two grades—one grade for cold weather; one for summer.

* * * *

There is good reason for this.

All oils tend to become a little thicker—a little sluggish in cold weather.

Now, fluidity of all oil is expressed in terms of Viscosity. Vis. varies with temperature. In the application of lubricants to street cars it is the operating temperature that counts. As the weather gets colder, the oils you used all summer will thicken. They will not then feed as freely. You can't change the temperature, but you can change the oils to compensate.

But weather doesn't change at a given date, so here's what we recommend:

Compensate gradually. Begin now (middle of October) adding steadily small quantities of LIGHTER oils to the lubricants now on the cars. This will gradually lower the Vis. keeping it normal all the time as winter comes.

So, now is the time to begin changing over to

TEXACO WINTER ELECTRIC CAR OIL
TEXACO WINTER AIR COMPRESSOR OIL
TEXACO WINTER GEAR LUBRICANT

Then all the time, even in the middle of winter, you will be fully protected by these carefully refined Texaco Lubricants.*

* * * *

As conditions vary throughout the country, watch the Thermometer more than the Calendar—and you will not be caught off-guard.

We have worked out an interesting and economical technique on roads all over the country and we will consider it a privilege to have our Texaco Lubrication Engineers discuss it with you in person.

There is a Texaco Lubricant for every purpose—for rolling stock, or power plant—everywhere along the line.

*In spring, reverse the process, gradually raising the initial vis. of the lubricants so that, under the heat of summer, the oils will "fall back" to their proper fluidity.

THE TEXAS COMPANY

DEPT. R-J. 17 BATTERY PLACE . NEW YORK CITY
HOUSTON . CHICAGO . NEW YORK
OFFICES IN PRINCIPAL CITIES

COLUMBIA'S
Best Known Specialties

BEARINGS
GEAR CASES
MOTOR COILS
TROLLEY WHEELS
TROLLEY EARS

A Service Station for Electric Railways

Specialists for many years in the manufacture of electric railway materials, practically our entire output is now consigned to your industry.

Although the items enumerated above are most widely used, we are making almost every kind of metal part and device used in car maintenance. Truck parts, motor parts and body fittings, standard or special, are all in our line. And we can make them at lower cost than your own shop.

Large stocks of standard parts always on hand, enable us to supply your wants promptly and satisfactorily. Use Columbia as your *service station.*

The Columbia Machine Works
and Malleable Iron Company
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. Green, Sales Mgr., Brooklyn, N. Y.
E. Keller, Brooklyn, N. Y.
F. C. Hedley, Brooklyn, N. Y.
J. L. Whittaker, 141 Milk St., Boston, Mass.
E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.

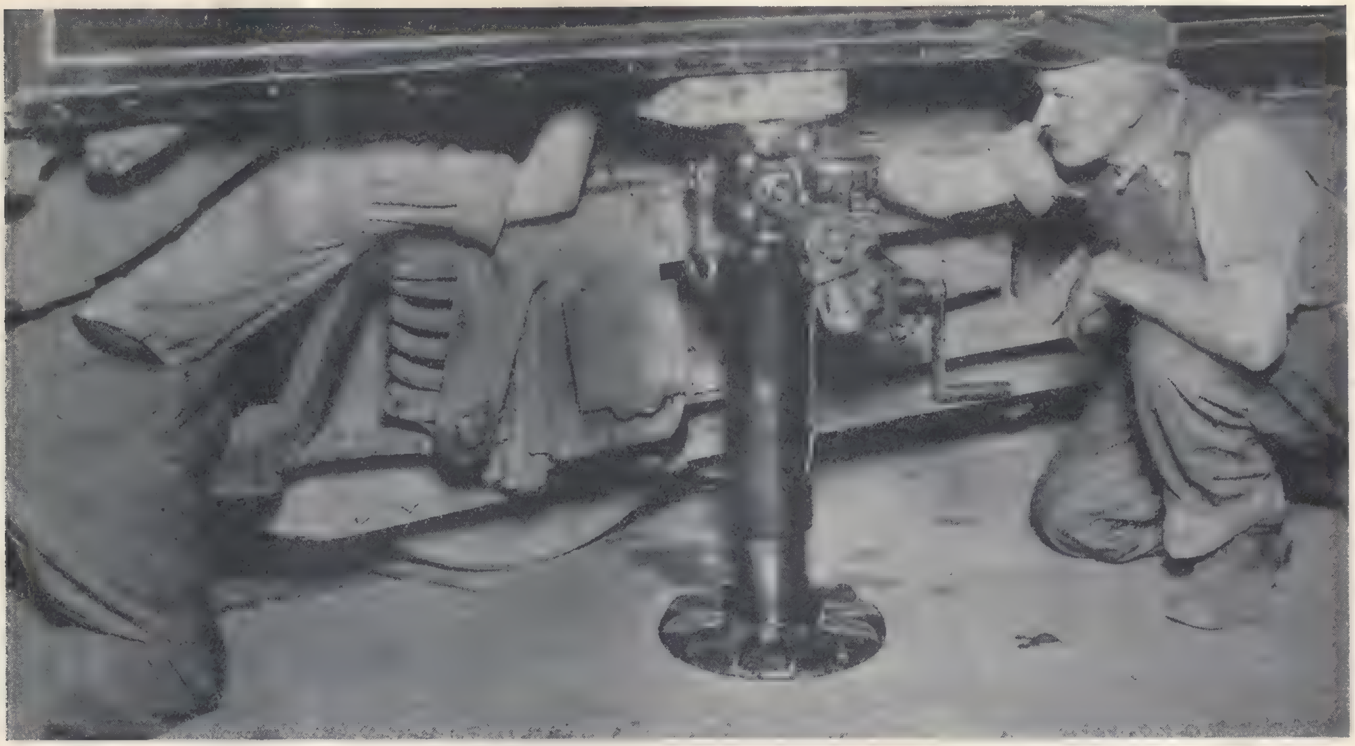
CARNEGIE
Wrought
Steel
Wheels

For real Service!

Carnegie Steel Company

GENERAL OFFICES: - - Carnegie Building - - PITTSBURGH, PA.

1575



DUFF JACKS

for Car Shop, Emergency or Track Lifting Service— use Duff Jacks

Duff High-Speed Ball Bearing Screw Jacks are the fastest raising, most powerful and easily operated jacks in existence. Made in sizes from 35-tons up to 75-tons capacity.

Duff Journal Jacks, in sizes from 10 tons up, are built to fill the requirements of electric railroads everywhere.

The Duff Emergency Car Jack No. 239 is the standard of America's electric traction companies, designed and built especially for them.

Tell us your requirements and we will show you the jack you want

THE DUFF MANUFACTURING COMPANY

Pittsburgh, Pa.

Established 1883

Branch Offices:

50 Church St.
New York, N. Y.

Peoples Gas Bldg.
Chicago, Ill.

Candler Bldg.
Atlanta, Ga.

Railway Exch. Bldg., St. Louis, Mo

Monadnock Bldg., San Francisco, Cal.

Emergency Car Jack

Track Jack

Kalamazoo

trolley wheels and harps

THE VERY FACT that Kalamazoo Trolley Harps and Wheels are made by the largest concern of its kind in the World is in itself an indication of their standard.

Our products are made in a shop devoted exclusively to these specialties. Today we are supplying the major part of the entire demand of the United States. There must be a reason for this and there *is*. And that is, a high reputation due to high quality.

Kalamazoo Trolley Harps and Wheels have been endorsed by the leading electric roads since their inception on the market, over 25 years ago.

Kalamazoo Harps give perfect and continuous contact, and are designed to permit easy replacement of wheels. There is only one cotter pin to be taken out to remove the wheel.

They are balanced for easy running and freedom from slippage. They do not wear down and damage the wire, for wire life is more important than wheel life.

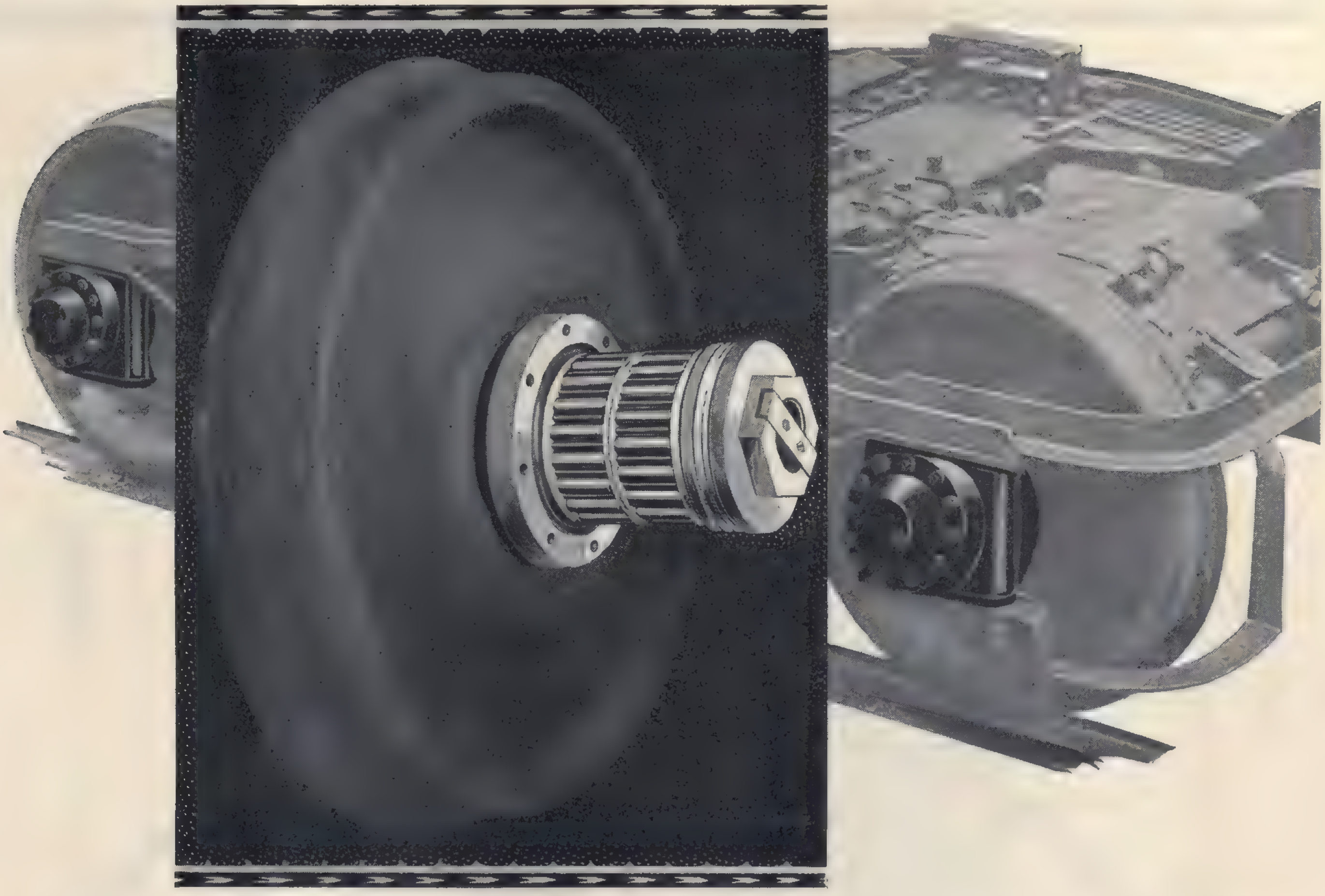
Kalamazoo wheels are made of virgin metal—pure lake copper—they are of proper design for the intended service, and are honestly manufactured.

Our Exhibit will be found at Space 71, Section C, Municipal Pier, Chicago

STAR BRASS WORKS

Kalamazoo, Michigan

The largest exclusive manufacturers of trolley wheels in the world



A REVOLUTIONARY POWER SAVER

90% reduction in journal resistance of cars offers you revolutionary savings in the power necessary to operate your lines.

A saving in power means economies all down the line, but it offers another vital advantage—it greatly increases the number of cars or trains for which your present transmission lines can furnish power.

These economies alone will quickly show profits on the installation of Stafford Bearings, but these bearings also show enormous savings in lubrication costs. *They require lubrication only once in 2 years.*

Write us regarding the power savings Stafford Roller Bearings can effect on your road.

STAFFORD ROLLER BEARING CAR TRUCK CORPORATION

LAWTON MICHIGAN

"IT ROLLS THE FRICTION AWAY"

for Sustained

V-K

Oilless
Trolley Wheels
And Non-Arcing Harps

Conductivity! That's the one purpose of a trolley wheel and right *there* is where the V-K Oilless Trolley Wheel and Harp surpasses.

V-K wheels are made of the *purest* kind of metal. It is absolutely NEW metal—not even the turnings from finishing or machining being re-used. It is the ideal metal for trolley wheels because it is extremely tough—yet not too hard. Thus the V-K wheel is easy on wires, maintains perfect groove contour and gives maximum mileage.

The V-K Trolley Wheel is self-lubricating and requires no oil. The graphite and bronze gauze bushing is heat-proof, frictionless, long-wearing, and easily interchangeable.

The V-K Non-Arcing Harp has a patented gripping device which insures a tight fit and good contact between harp and axle pin. There are absolutely no power wastes about either the V-K Trolley Wheel or Harp.

We invite your investigation and inquiries.

More-Jones Brass & Metal Co., St. Louis Mo.

More-Jones

Low-Cost Operation

M-J

Armature Babbitt

Ordinary babbitt for armatures can never stand the wear and tear of electric railway service. It takes a babbitt specially made to withstand the pounding, strain, vibration and high temperatures. That's why the leading electric railways both here and abroad use M-J Armature Babbitt exclusively.

This babbitt is made for the *purpose*. It is made to endure high speed and severe service. Being compounded of a tin base, nickel hardened, it contains no lead and so has none of the brittleness of lead-base metals. On account of its great flexibility and tensile strength it will not creep or spread under excessive strains.

Re-babbitt your armature bearings with M-J Armature Babbitt and keep your cars in service with the longest possible interval between re-babbitting.

More-Jones Brass & Metal Co., St. Louis Mo.

More-Jones

"49"

THE map above shows the location of the 49 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 3
St. Louis, 2
Buffalo, 4
Pittsburgh, 2
Cleveland, 2
Amherst, N. S.
Montreal
Mich. City, Ind.
Louisville
Mt. Vernon, Ill.
Ft. Wayne, Ind.
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul
Kansas City, Kan.
Denver
Tacoma
Sayre, Pa.
Berwick, Pa.
Albany
Toronto
New Glasgow, N. S.
Madison, Ill.
Huntington, W. Va.
Wilmington, Del.
Houston, Tex.
Hannibal, Mo.
Reading, Pa.
Baltimore
Richmond, Va.
Ft. William, Ont.
St. Thomas
Hamilton
Ramapo, N. Y.
Marshall, Tex.
Los Angeles
Council Bluffs
Rochester, N. Y.

American Railroad Association Standards

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy-One Years

CHILLED IRON WHEELS for railway and street car service. Capacity 20,000 per day. 25,000,000 in service.

ASSOCIATION OF MANUFACTURERS
OF CHILLED CAR WHEELS
1847 McCormick Bldg., Chicago

CHILLED IRON WHEELS

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege if not the practice of all modern manufacturers."—*Vauclain.*

Good Railroad Forgings can only be made by following the most approved manufacturing methods, by careful workmanship and by realizing and building to provide for the service that the Forgings must undergo in Railroad operation....

Put our Forgings on your Road and compare their life with any other brand you use....

SSS

- Steel Tires
- Steel Tired Wheels
- Solid Forged and Wrought Steel Wheels
- Rolled Steel Gear Blanks
- Steel Axles
- Steel Springs
- Steel Forgings
- Steel and Malleable Iron Castings
- Rolled Steel Rings
- Steel Crusher-Rolls and Shells
- Steel Pipe Flanges

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO
ST. LOUIS
HAVANA, CUBA

HOUSTON, TEXAS
PORTLAND, ORE.
RICHMOND, VA.

SAN FRANCISCO
NEW YORK
BOSTON

ST. PAUL, MINN.
PITTSBURGH, PA.
MEXICO CITY, MEX.

LONDON, ENGLAND
PARIS, FRANCE

WORKS: BURNHAM, PA.

Have you noticed?

Any time, anyone, before any convention, has ever bragged of fine pinion records – the pinions always happen to be

Cincinnati "Tool Steel"?

And yet we are told other pinions are "just as good"!

Convinced

Well, Dick, what did you see at the Pier, anything interesting?

Boss, I certainly am glad you let me go there. I saw so many good things and new things, that I am full of new ideas, and plans.

I want to tell you I am much easier in my mind about the Helical Gears I got you to let me try. You know I told you how fine they were doing, but I was a little afraid it might just be my good luck, but when I saw the gears from different roads at the Nuttall exhibit with the mileage and wear, and heard the reports from my friends in other places, I made up my mind we were on the right track.

Why, boss, that old No. 1 gear and pinion put in service in 1915 have run 450,000 miles and look just as true as if they were new, and look good for 100,000 miles or more, while the other gears that have been in service show so little wear that you can hardly measure it. We won't make any mistake when we adopt the Helicals as standard, and I wish I could tell you about the No. 13 base with all the wearing parts hardened and ground. We have them in use, but I didn't know how good they were.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for Nuttall Electric Railway and Mine Haulage Products.

In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

EVERY GEAR REGISTERED

Nuttall

Special Standard Bronze (S. S. B.) High Strength Trolley Wire

meets every demand made upon it in any service requiring durability, dependability and economy under most severe operating conditions. Rigid service tests by unbiased engineers under such conditions have demonstrated the superior strength, rust and wear-resistance of S. S. B. wire over hard drawn copper and steel wires. Among high strength trolley wires it has no superior.

We invite comparisons and will appreciate an opportunity to send samples. Write our nearest office.

Standard Underground Cable Co.

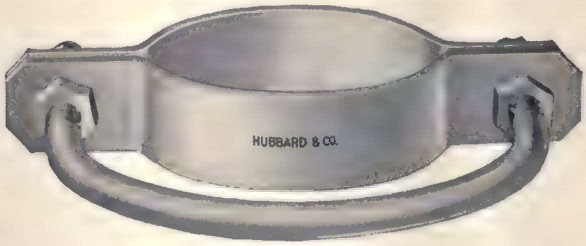
Pittsburgh, Pa.

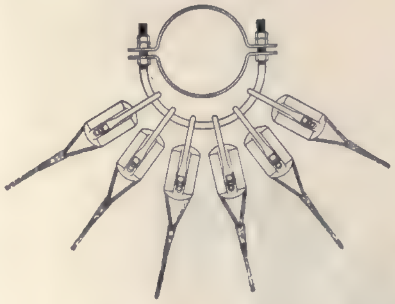
Boston
New York
Washington
Atlanta
Pittsburgh
Detroit
Chicago
Seattle
St. Louis
Philadelphia
Los Angeles
San Francisco

For Canada: Standard Underground Cable Co. of Canada, Limited
Hamilton, Ont.

TRADE MARK

There's no need for six bands on this pole





One HUBBARD Band is all that is necessary

The sketch shows how the six guys could lead off from one band by using the Hubbard Band and Pull-Off Rod. The Hubbard Band with Pull-Off Top not only simplifies line work, but conserves stock room space and reduces band costs. Made in all standard pole sizes.

HUBBARD & CO., PITTSBURGH, PA.

A Far-Sighted Banker's Idea of Advertising

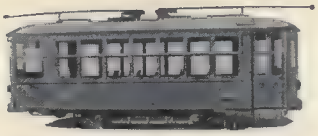
By FESTUS J. WADE
President
Mercantile Trust Company
of St. Louis

DO I believe that a banker considers reputation, as developed by advertising, in extending credit? There probably are bankers who will give a negative answer to this question and believe they are giving the right answer.

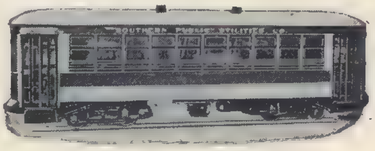
But let those bankers be approached by a credit-seeking national advertiser, who has established his name, therefore a market for his goods, and see what happens. In nine cases out of ten the fact that those goods have become a "buyword" will be the greatest factor in granting the credit.

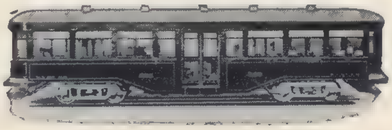
[Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies]

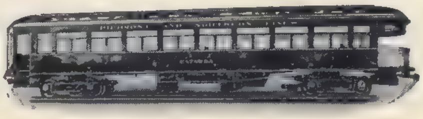
Our Cars Cost Less To Maintain



Safety First







Cars of All Types
From
Birney One-Man Safety
To
Large City and Interurban

SPECIALTIES

Sash, Doors, Interior Finish and Framing, Curtains, Ventilators and Car Trimmings, Brakes, Gongs, Door and Step Mechanism.

"We Satisfy"
Give Us A Trial

Perley A. Thomas Car Works
High Point, N. C.

WHEN RAILWAY MEN

in general, study the question of *wood durability* for other purposes, as carefully as *Railway Signal* men have studied it for *Trunking* and *Capping*, there will be a lot more

"ALL-HEART"
"TIDEWATER"
CYPRESS
"THE WOOD ETERNAL"

used for *Fencing, Ties, Cross-arms, Car Material, Station Construction* and similar railroad requirements, *to the very great economy of the companies using it.*

The long service which "*All-Heart*" *Cypress* gives,

SAVES LABOR COSTS
FOR RENEWALS AND
REPLACEMENTS

—big items in themselves.

"All-Heart" Cypress comes nearer being decay proof than any other wood.

This mark on every timber, board and bundle of Cypress is your *insurance of true replacement economy.*

The data in support of these facts will be promptly furnished upon request.

SOUTHERN CYPRESS MFRS.' ASSN

1265 Poydras Building, New Orleans, La., or
1265 Graham Building, Jacksonville, Fla.

Upina

A Kaffir child is named for its chief characteristic.

For instance, the boy who sneaks out of the shack the moment the Old Man's back is turned, and never returns until after chore time, would be named *Upina*, meaning—*"Where is he?"*

Sensible idea. Lots better than our custom of naming him Percy or Lionel just because Grandpa Percival got to Congress or Uncle Lionel made a million by inventing the Disappearing Bottle for Cautious Bootleggers.

The name means something—just like Morganite.

Morganite is more than a motor brush. It is a complete line of scientifically graded Motor Brushes sold on *prescription*. When a Morganite engineer prescribes for you—*your* brush trouble is over!

Say when . . .

Morganite
Brush Co., Inc.

Main Office and Factory:

519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co., 909 Penn. Ave., Pittsburgh

J. F. Drummey, 75 Pleasant St., Revere, Massachusetts.

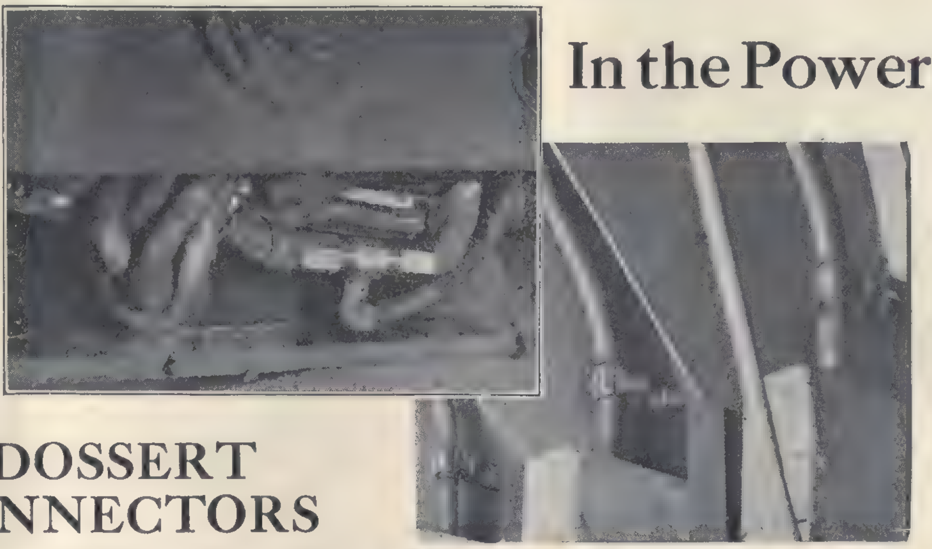
W. R. Hendey Co., Hoge Bldg., Seattle

Herzog Electric & Engineering Co., 150 Steuart St., San Francisco

Special Service Sales Company, 502 Delta Bldg., Los Angeles

Railway & Power Engineering Corporation, Ltd., 131 Eastern Ave., Toronto,: Ontario, Canada

On the Cars and In the Powerhouse



Dossert 3-way Connector on Safety Car of Third Avenue Railway New York

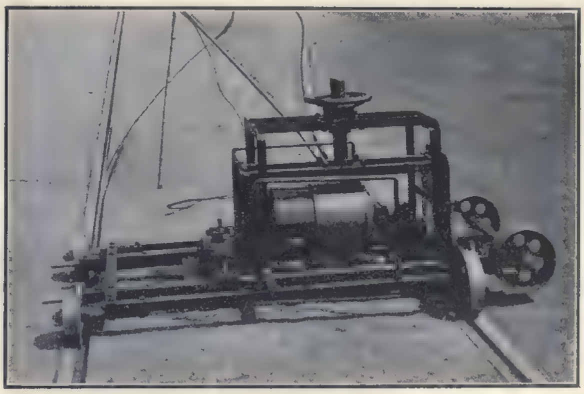
Dossert Cable Taps in plant of Montana Power Co. furnishing power for C. M. & St. P. electrification

DOSSERT CONNECTORS

Write for Catalog showing the various services on which Dossert Solderless Connections will save you money.

DOSSERT & COMPANY, 242 West 41st Street
New York

Many Roads are saving money with



SEYMOUR MIDGET RAIL GRINDERS

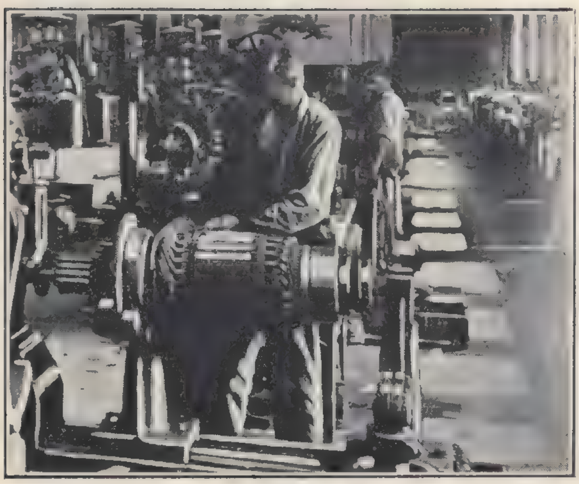
It will pay you to investigate the possiblities and economies of Seymour Midget Rail Grinders. We will gladly furnish you with the names of roads and roadmasters using them. They are a necessity for any road, no matter how small, because—

They prolong the life of track
Do any kind of rail grinding
Are economical to operate and maintain
Operation is easily learned
The initial cost is low

Write for booklet.

E. P. Seymour Rail Grinder Co.
Waltham, Mass.

Get better service from armatures with



IRVINGTON

Black Varnished Cambric

30% Higher Dielectric Strength
100% Better Heat Resistance
100% More Alkali and Acid Resistance
200% Better Aging Qualities
200% More Resistance to Oil.
Than Yellow Varnished Cambric

Send for samples

Irvington Varnish & Insulator Co., Irvington, N. J.
ESTABLISHED 1905

Sales Representatives

Mitchell-Rand Mfg. Co.
New York

Clapp & LaMoree
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E. M. Wolcott
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L. L. Fleig & Co.
Chicago, Ill.

F. C. Scofield
Toronto, Ont., Canada

You're having brush trouble

CORRECT IT

Use Le Carbone Carbon Brushes

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

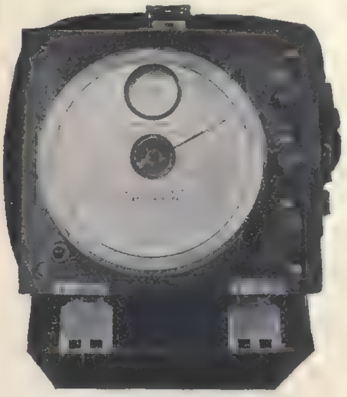
W. J. JEANDRON
345 Madison Avenue, New York
Pittsburgh Office: 634 Wabash Bldg.
San Francisco Office: 525 Market Street
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

ROLLER-SMITH

The "One-Man" Bond Tester

Light, compact and reading directly in units of feet-of-rail, this Bond Tester is ideally suited to one-man manipulation. Its "saw-tooth" contacts insure correct readings without loss of time.

It will pay you well to keep your rail bonds in good condition. The Roller Smith Bond Tester enables you to locate the bad ones.


Front View of Instrument

Bar in place on "T" Rail Showing Saw Blade Contact

Bar in Place on "Girder" Rail Showing Saw Blade Contact

Write now—

for descriptive Bulletins G-200 and G-201

ROLLER-SMITH COMPANY
Electrical Instruments, Meters and Circuit Breakers

2128 Woolworth Bldg.
NEW YORK

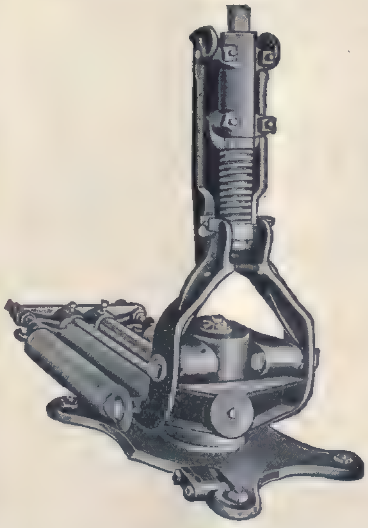
Works
BETHLEHEM, PA.

Baltimore, 113 E. Franklin St.
Birmingham, Brown-Marx Bldg.
Boston, 141 Milk St.
Buffalo, Ellicott Square
Chicago, 430 S. Green St.
Cleveland, 7016 Euclid Ave.
Dallas, 2002½ Live Oak St.
Denver, U. S. Nat'l Bank Bldg.
Los Angeles, Title Insurance Bldg.
Memphis, 493 S. Main St.
Montreal, Power Bldg.
New Orleans, Whitney Central Bldg.
Philadelphia, Otis Bldg.
Pittsburgh, Keenan Bldg.
Salt Lake City, Dooly Bldg.
St. Louis, Railway Exchange Bldg.
St. Paul, Pioneer Bldg.
San Francisco, 589 Howard St.
Scranton, Board of Trade Bldg.
Seattle, Hinckley Bldg.
Toronto, 183 George St.

A Harp You Can Change in the Dark

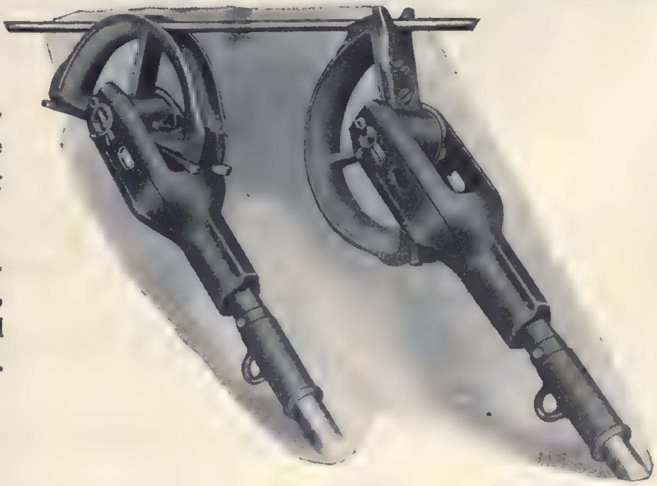
And keep your cars in service. No loss of schedule time. No tools but your hands. Only **Ten Seconds Time Required.** All repairing, adjusting and lubricating done at the work bench.

From Trolley Wheel to Semi-Rotary Sleet Cutter in 10 SECONDS without any tools.



Bayonet Anti-Friction Base has all wearing parts bushed.

Self-Lubricating. Non-Breakable, Poles Changed in One Minute.


Backing Up Going Forward

Write for full particulars and free trial

BAYONET TROLLEY HARP CO., Springfield, Ohio

Van Dorn Car-Air-Electric Couplers

A type for every class of service

The following features of Van Dorn Electric Couplers are successfully accomplished by the fact that the *Car Couplers* are brought into positive alignment by means of machined surfaces and by the "Tight-Lock" principle:

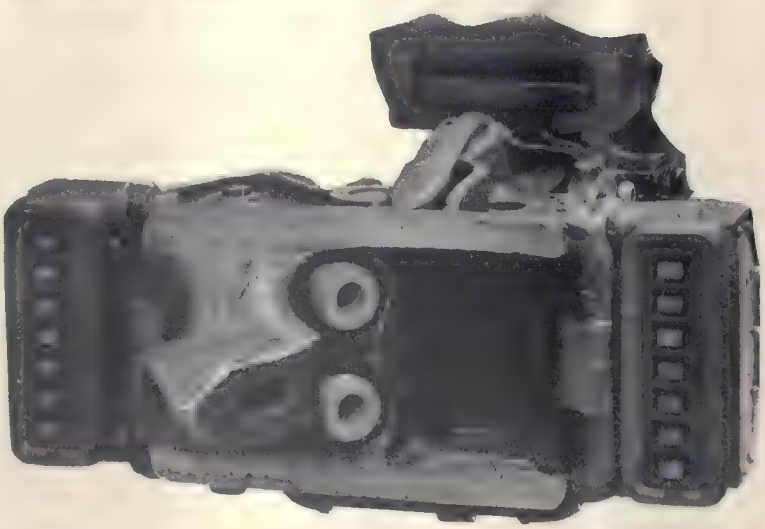
(1) Positive alignment of Electric members assured before coupling.

(2) Electric Couplers protected against striking each other when cars are coupling.

(3) Contacts wiped in act of coupling.

(4) Motion of Electric members relative to one another prevented after coupling, thereby assuring an invariable pressure between contacts.

(5) Water-proof joint maintained around contacts.



The insulating material is molded *Redmanol* — so designed as to afford a maximum amount of creepage surface between contacts.

A unique design of insulation and contacts prevents rain or snow from beating into interior of Electric Coupler when at dead-end of train.

Van Dorn Coupler Company

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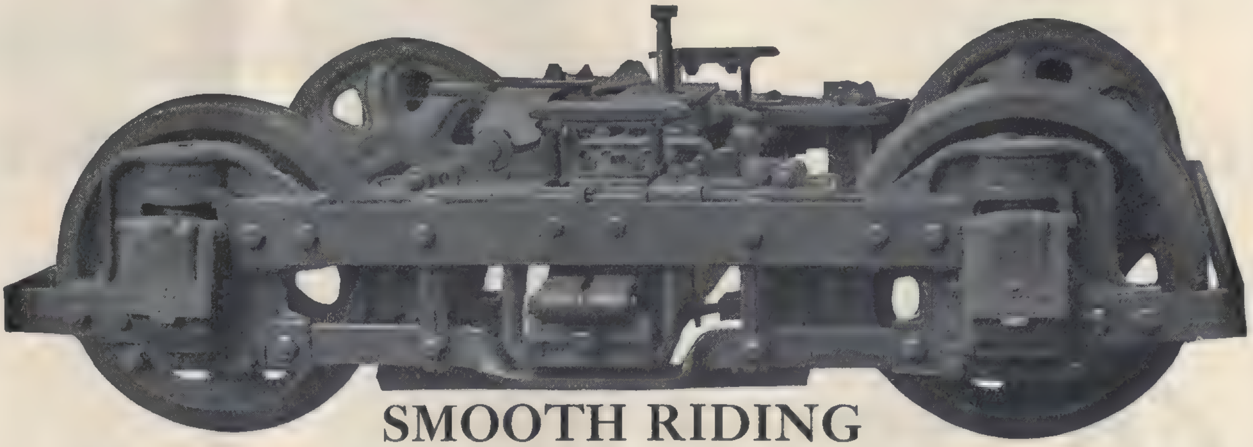

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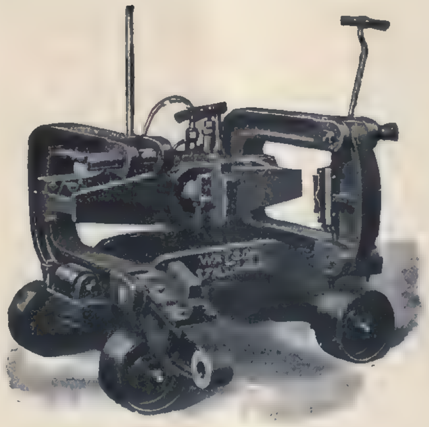

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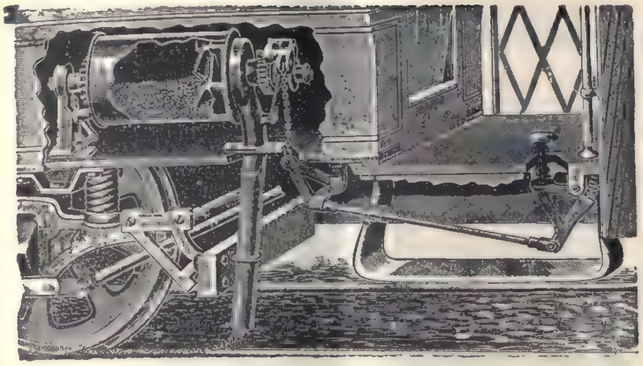

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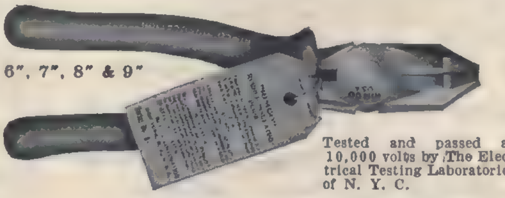

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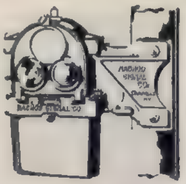

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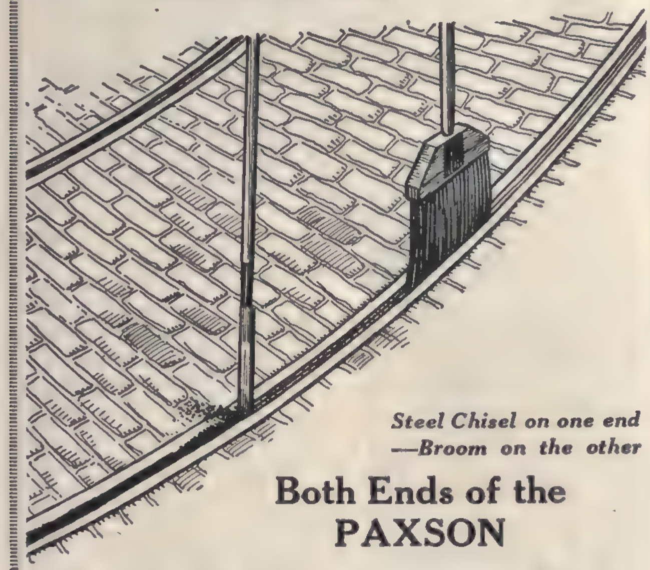

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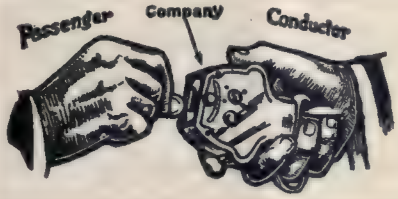

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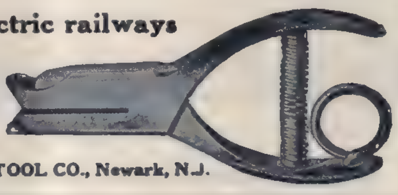

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Machine Shop
Miscellaneous equipment

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BRASS

919,569 Pounds for Sale by Sealed Bid
Closing at 12 o'clock Noon May 25th 1922

At Frankford Arsenal, Phila, Pa.

Terms of Sale:

Bids will be received for the entire lot only, and must be accompanied by a certified check or U. S. bonds to the amount of 10% of the bid. The material is loose and is to be sold f. o. b. cars at Westville, N. J.

No guarantee is given as to quality, quantity, analysis, weight or condition and no refund or adjustment will be allowed after award is made. Inspection of the material is invited. Awards will be made within 72 hours after opening of the bids. The Government, however, reserves the right to reject any or all bids

SEALED bids for the purchase of approximately 919,569 pounds of Brass Extrusion and Regular Caps for caliber .30 cartridge cases, located at the Woodbury Ordnance Reserve Depot, Westville, N. J., will be received by the Philadelphia District Ordnance Salvage Board not later than 12 noon Thursday, May 25, 1922.

Proposal blanks must be signed in ink by bidders and should be inclosed in a sealed envelope addressed to the undersigned and marked "*Bid for the purchase of Brass Extrusion and Regular Caps for Cartridge Cases.*"

cular proposal blanks containing complete in- on as to terms and conditions will be fur- application to

WAR DEPARTMEN

OCTOBER

Oct. 10—Q. M. Supplies — Car Grant, Ill. Auction. For catal write Q. M. S. O., 1819 Pe shing Road, Chicago, Ill.

Oct. 10—Medical Supplies — Ne York City. Auction. For catal write Surplus Property Sec Office Surgeon General, Washin ton, D. C.

Oct. 11—Air Service Supplies—Ca strom Field, Fla. Auction. F catalog write Commanding Office Carlstrom Field, Fla.

Oct. 17—Q. M. Supplies—Camp Di N. J. Auction. For catalog wri Q. M. S. O. 1st Ave. and 59 St., Brooklyn, N. Y.

Oct. 19—Power House Equipment- Rock Island, Ill. Sealed Bids. F catalog write C. O., Rock Islan Arsenal, Rock Island, Ill.

Oct. 24—Air Service Equipment- Montgomery, Ala. Auction. F catalog write C. O., Air Reser Depot, Montgomery, Ala.

Oct. 24—Floating Equipment—Po Newark, N. J. Auction. For cat log write Q. M. S. O., 1st Av and 59th St., Brooklyn, N. Y.

Oct. 27—Medical Supplies—Was ington, D. C. Auction. For cat log write Surplus Property Sec Office Surgeon General, Washin ton, D. C.

Oct. 30—Air Service Equipment- Richmond, Va. Auction. F catalog write C. O., Air Reser Depot, Richmond, Va.

SEND FOR CATALO

The Government res

WAR DEP

U.S.

SELLING PROGRAM

NOVEMBER

Nov. 10—Q. M. Supplies—Schenectady, N. Y. Auction. For catalog write Q. M. S. O., 1st Ave. and 59th St., Brooklyn, N. Y.

Nov. 14—Q. M. Supplies—Camp Lewis, Wash. Auction. For catalog write Q. M. S. O., Ft. Mason, San Francisco, Calif.

Nov. 14—Air Service Equipment—Long Island, N. Y. Auction. For catalog write C. O., Air Service Depot, Long Island, N. Y.

Nov. 15—Q. M. Supplies—Brooklyn, N. Y. Auction. For catalog write Q. M. S. O., 1st Ave. and 59th St., Brooklyn, N. Y.

Nov. 16—Medical Supplies—Philadelphia, Pa. Auction. For catalog write Surplus Property Sect., Office Surgeon General, Washington, D. C.

Nov. 21—Q. M. Supplies — Camp Knox, Ky. Auction. For catalog write Q. M. S. O., 1819 W. Pershing Road, Chicago, Ill.

Nov. 23—Q. M. Supplies—Chicago, Ill. Auction. For catalog write Q. M. S. O., 1819 W. Pershing Road, Chicago, Ill.

Nov. 28—Q. M. Supplies — New Orleans, La. Auction. For catalog write C. O., Q. M. Surplus Property Depot, Atlanta, Ga.

DECEMBER

Dec. 5—Q. M. Supplies—San Antonio, Tex. Auction. For catalog write Q. M. S. O., Ft. Sam Houston, San Antonio, Texas.

Dec. 12—Q. M. Supplies—Columbus, Ohio. Auction. For catalog write Q. M. S. O., 1819 W. Pershing Road, Chicago, Ill.

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Just turn to the War Department announcements of Surplus Property Sales.

You will soon find something you need. And when you do, be sure to send at once for the catalog—for it will point out an opportunity such as has never occurred in the past and is unlikely ever to occur in the future.

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ht to reject any or all bids

ARTMENT

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Circuit Breakers
Roller-Smith Co.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Ammeters
Roller-Smith Co.
Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stand
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Midvale Steel & Ord. Co.
Standard Steel Works
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Supplies Co.
International Register Co., The
Bankers and Brokers
Coal & Iron National Bank
Batteries, Dry
National Carbon Co.
Nichols-Lintern Co.
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons B. F. Co.
More-Jones Br. & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Bearings, Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Co.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Benders, Rail
Ry. Track-work Co.
Watson-Stillman Co.
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Babcock & Wilcox Co.
Edgemoor Iron Co.
Boiler Tubes
Cambria Steel Co.
Edgemoor Iron Co.
Midvale Steel & Ord. Co.
National Tube Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Rail Welding & Bonding Co.
Roller-Smith Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Imp. Co.
Elec. Service Suplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Bonds, Rail
Amer. Steel & Wire Co.
Elec. Railway Imp. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
American Bridge Co.
Bates Exp. Steel Truss Co.
Creaghead Eng. Co.
Elec. Ry. Equip. Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.
Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
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American Copper Products Corp.
Bridges & Buildings
American Bridge Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
National Carbon Co.
Westinghouse Elec. & M. Co.
Brushes, Graphite
National Carbon Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Bunkers, Coal
American Bridge Co.
Bus Bars
Amer. Copper Prods. Corp.
Bus Seats
Hale & Kilburn Corp.
Buses, Motor
Brill Co., The J. G.
Bushings
Nat'l Fibre & Insulation Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Cables
(See Wires and Cables)
Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.
Carbon Brushes
(See Brushes, Carbon)
Car Lighting Apparatus
Elec. Service Supplies
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
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Differential Steel Car Co., Inc.
Cars, Passenger Freight Express, etc.
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Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire Cummings Mfg. Co.
Midvale Steel & Ord. Co.
National Ry Appliance Co.
Wason Mfg. Co.
Witt, Peter
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Electric Equipment Co.
Cars, Self-Propelled
General Electric Co.
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Ajax Metal Co.
Anderson Mfg. Co., A & J. M.
Columbia M. W. & M. I. Co.
More-Jones Br. & Metal Co.
Castings, Funnel
Wharton, Jr., & Co., Inc. Wm.
Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Wharton Jr., & Co., Inc., Wm.
Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Catchers and Retrievers Trolley
Earll, C. I.
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Ceiling, Car
Pantasote Co., The
Circuit Breakers
Cutter Co.
General Electric Co.
Roller-Smith Co.
Westinghouse Elec. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equip. Co.
Elec. Service Supplies Co.
Dossert & Co.
General Electric Co.
Hubbard & Co.
Westinghouse Elec. & M. Co.
Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
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Johnson Fare Box Co.
Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
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General Electric Co.
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General Electric Co.
Westinghouse Elec. & M. Co.
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Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Compressors, Gas
Ingersoll-Rand Co.
Concrete Reinforcing Bars
Cambria Steel Co.
Midvale Steel & Ord. Co.
Condensers
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Conduits, Underground
Std. Underground Cable Co.
Connectors, Solderless
Dossert & Co.
Westinghouse Elec. & M. Co.
Connectors, Trailer Car
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Ohio Brass Co.
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Westinghouse Elec. & M. Co.
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Electric Service Supplies Co.
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Westinghouse Elec. & M. Co.
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General Electric Co.
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American Bridge Co.
Columbia M. W. & M. I. Co.
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Spray Engineering Co.
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Amer. Copper Prods. Co.
Copper Wire
Anaconda Copper Mining Co.
Cord Adjusters
Nat'l Fibre & Insulation Co.
Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works
Silver Lake Co.
Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The, J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Tr. Br. Co.
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Crossings
Ramapo Ajax Corp.
Crossing Foundations
International Steel Tie Co.
Crossing Frogs and Switches
Ramapo Ajax Corp.
Wharton, Jr., & Co., Inc., Wm.
Crossings, Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
Crossing Signals. (See Signals, Crossing)
Crossings, Track. (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Culverts
Canton Culvert & Silo Co.
Curtains and Curtain Fixtures
Brill Co., The, J. G.
Electric Service Supplies Co.
Morton Mfg. Co.
Pantasote Co., The
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Electric Equipment Co.
Transit Equipment Co.
Derailing Switches, Tee Rail
Ramapo Ajax Corp.
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Creaghead Eng. Co.
Electric Service Supplies Co.
Detective Service
Wish Service, P. Edward
Dogs, Lathe
Williams & Co., J. H.
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Consolidated Car Heating Co.
National Pneumatic Co., Inc.
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Brill Co., The, J. G.
General Electric Co.
Hale & Kilburn Corp.
Safety Car Devices Co.
Doors, Folding Vestibule
National Pneumatic Co., Inc.
Draft Rigging. (See Couplers)
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Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.
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Electric Service Supplies Co.
Ears
Ohio Brass Co.
Electric Grinders
Railway Track Work Co.
Seymour Rail Grinder Co., E. P.
Electrodes, Carbon
Indianapolis Switch & Frog Co.
Railway Track Work Co.
Electrodes, Steel
Indianapolis Switch & Frog Co.
Railway Track Work Co.
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American Elec. Works
Roeblings Sons Co., J. A.
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Byllesby & Co., Inc., H. M.
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Dodd, J. N.
Drum & Co., A. L.
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Holst, Engelhardt W.
Jackson, Walter
Kelly, Cook & Co., Inc.
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Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
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Smith & Co., C. E.
Stone & Webster
Witt, Peter
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Westinghouse Elec. & M. Co.
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Cambria Steel Co.
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Midvale Steel & Ordnance Co.
Standard Steel Works Co.
Williams & Co., J. H.
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track. (See Track Work)
Frogs, Trolley
Ohio Brass Co.
Fuses and Fuse Boxes
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Westinghouse Elec. & M. Co
Williams & Co., J. H.
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General Electric Co.
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Gasolene Torches
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Brill Co., The, J. G.
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Cambria Steel Co.
Midvale Steel & Ord. Co.
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Grinders, Portable
Railway Track Work Co.
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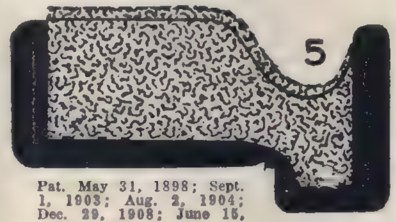

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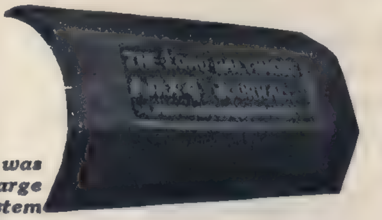

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The merchants along your lines will help you because they will be helping themselves

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Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Helmets, Welding
Indianapolis Switch & Frog Co.
Headlights
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Headlining
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Consolidated Car Heating Co.
Economy Electric Devices Co.
Gold Car Heating & Lighting Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter
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Electric Service Sup. Co.
Smith Heater Co., Peter
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Ohio Brass Co.
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Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Westinghouse Elec. & M. Co.
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Creaghead Engineering Co.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
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Electric Service Sup. Co.
Hubbard & Co.
Insulation Slot
Irvington Varnish & Ins. Co.
Insulating Varnishes
Irvington Varnish & Ins. Co.
Insurance, Fire
Marsh & McLennan
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Peters & Co., G. D.
Jacks. (See also Hoists and Lifts)
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Brill Co., The, J. G.
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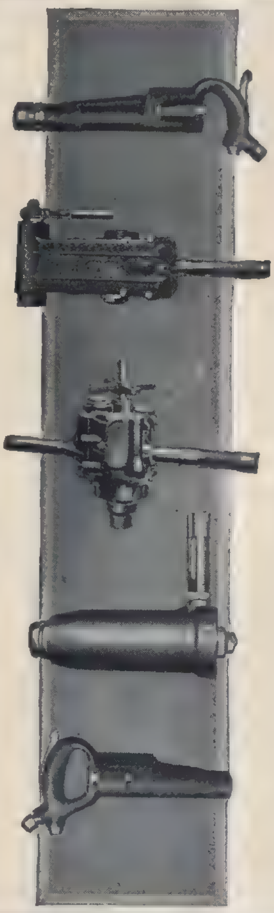

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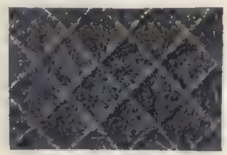

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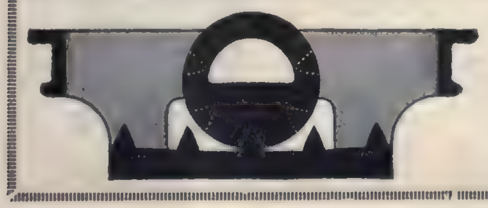

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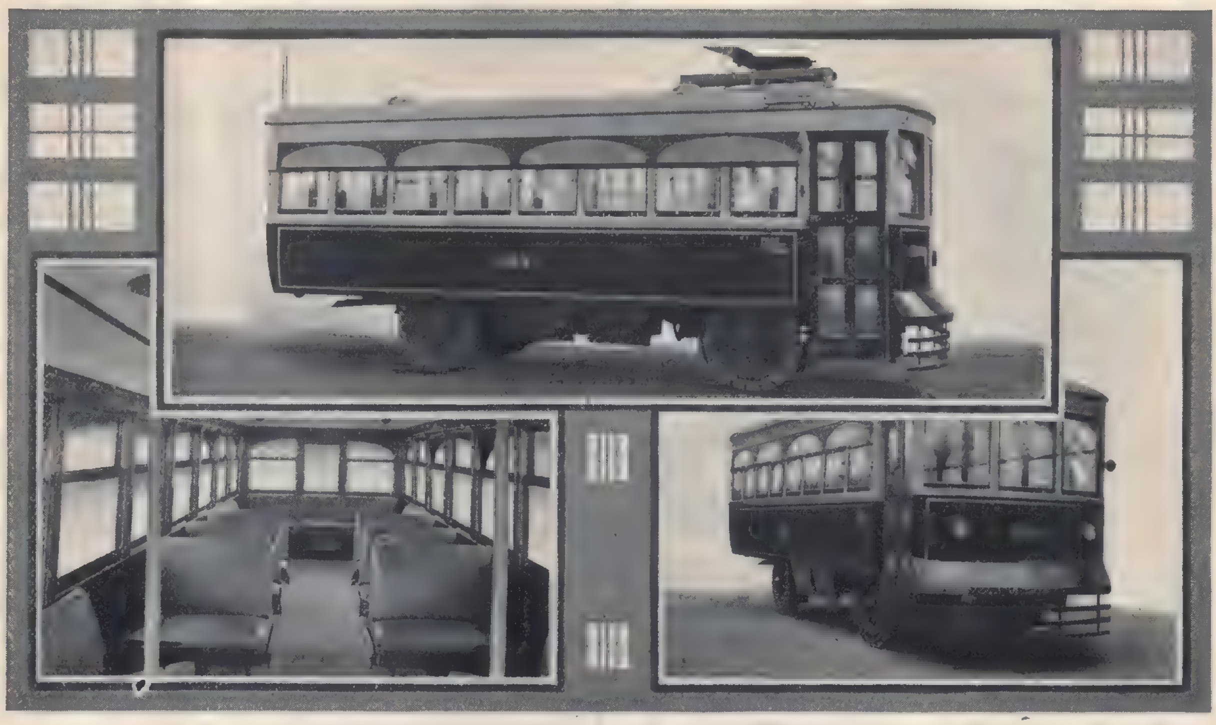


Low Operating Cost Favorable to Brill Rail-less Cars

The successfully and economically operated Brill Rail-less Cars enable railways to make service extensions to points where the initial cost of rail service would now be prohibitive. The operating cost of Brill Rail-less Cars is almost equally as low as the modern light-weight cars and, particularly where there is every indication that traffic will ultimately be developed to warrant the laying of rails and operation of Safety Cars, this type vehicle is admirably adapted.

The Brill Rail-less Car is propelled by two (2) 25-hp. motors at 550 volts, mounted in tandem amidship and driving the rear axle through a propeller shaft. Its seating capacity is 30.

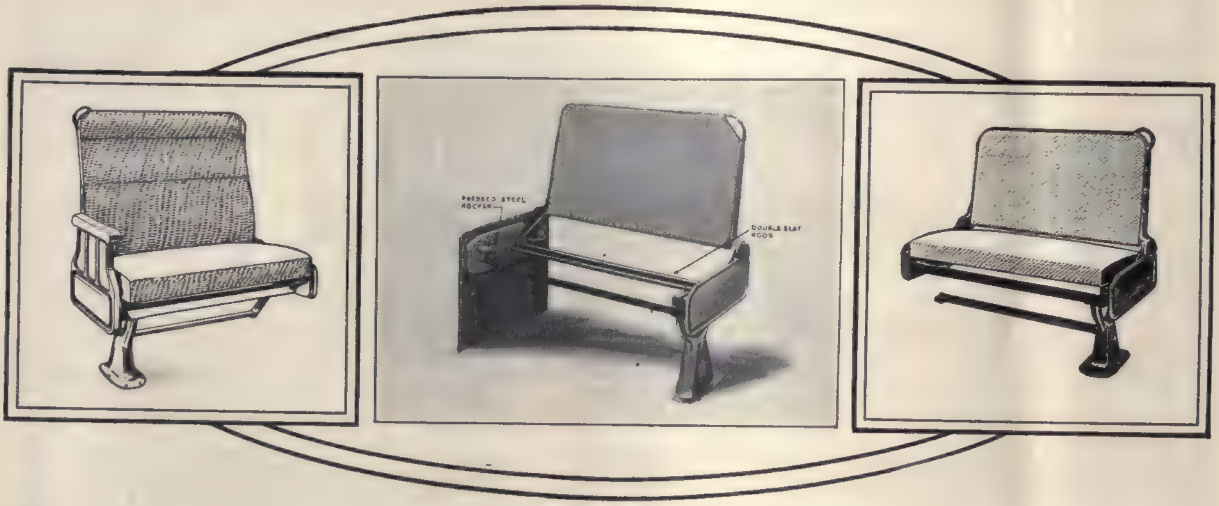
THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.

SEATS AND SEATING RATTAN

BRILL

CAR AND TRUCK SPECIALTIES



Brill "Winner" Seats

For Every Class Service

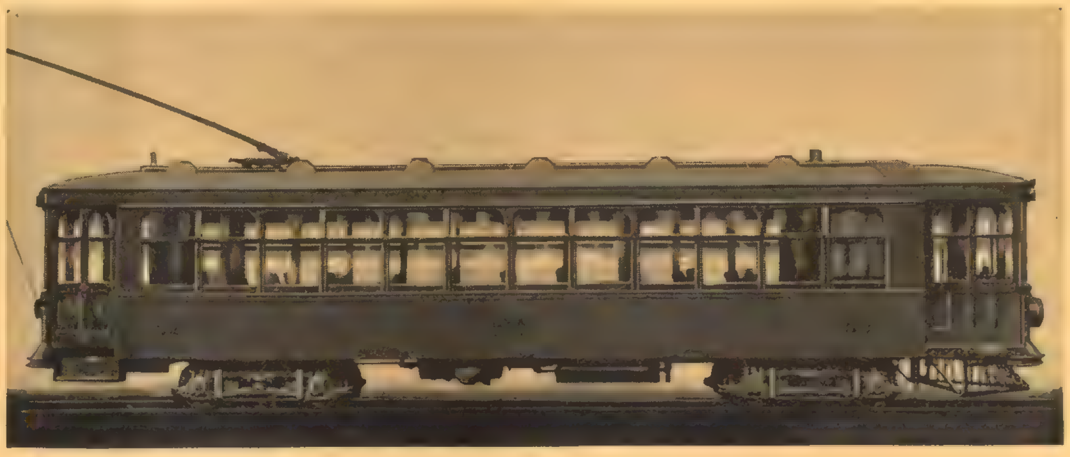
Brill Seats have always been accepted as representing the last word in car seats. Both the "Winner" and "Waylo" types of reversing mechanisms have proved most satisfactory in service and continue to hold first rank in their respective classes.

All reversible and non-reversible seats for passengers, including the rattan upholstery, as well as a variety of types for motormen and conductors, are manufactured complete, ready for installation.

To the use of pressed-steel pedestals and aisle plates, and the minimum number of parts used in their construction, the extreme light-weight characteristic of all Brill seats is attributed.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — ST. LOUIS MO.
G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO.
WASON MANF'G CO. — SPRINGFIELD, MASS.

CARS BRILL TRUCKS



Light-Weight Interurban Cars

Combination Passenger, Smoking and Baggage Type

Ten light-weight interurban cars of an especially interesting type, recently developed by the G. C. Kuhlman Car Company, have just been placed in service by the Western Ohio Railway Company, Lima. In determining the character of construction and proportions of this type interurban car every effort was made to obtain the lightest weight without sacrificing durableness of construction or the riding comfort so essential to this class service.

The Brill low-level type truck No. 77-E-1, on which these cars were mounted, includes solid-forged sideframes and such other important Brill features as the Bolster Guide, Graduated Spring System and Half-Ball Brake Hangers, all of which have an important influence on its riding action.

These Western Ohio cars measure 45 ft. ⅞ in. over bumpers, are 8 ft. 8½ in. wide over all, seat 48 passengers and weigh, complete, only 32,462 lbs. They are equipped with four (4) 35-hp. motors

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

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INCORPORATED
Candler Bldg., New York

McGraw-Hill Co., Inc. October 14, 1922 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

Republic Knight-Motored Buses in service of The Connecticut Co., New Haven, Conn.

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REPUBLIC
KNIGHT-MOTORED BUS

TRANSPORTATION IS A NATURAL MONOPOLY, SUBJECT TO REGULATION

THE development of a motor bus of maximum efficiency, for supplementary and feeder service, involves more than the mere mounting of a passenger body on a standard truck chassis.

The Republic Knight-Motored Bus, designed and built to meet the exacting demands of passenger transportation, has clearly proven its fitness for such work in the service of prominent railway companies.

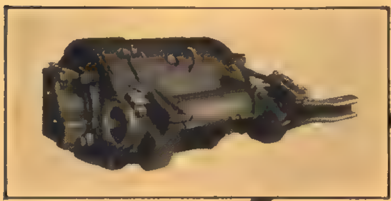
Public Utility Companies are invited to consult our Public Utilities Division without obligation.

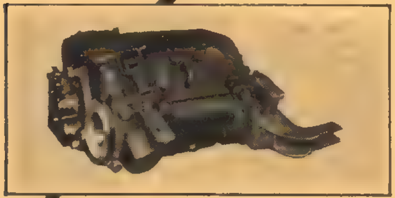
REPUBLIC TRUCK SALES CORPORATION
ALMA, MICH.

REPUBLIC

Westinghouse Railway Motors Are In Step With Modern Requirements

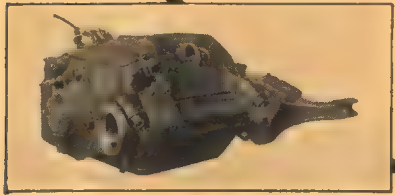
For City and Suburban Service


No. 508 Motor
25 hp.–1035 lbs.


No. 510 Motor
35 hp.–1475 lbs.

No. 514 Motor
40 hp.–1650 lbs.

No. 532 Motor
50 hp–2300 lbs.


No. 306 Motor
65 hp.–2700 lbs.

INDUSTRIAL progress sets the pace that must be met by all business enterprises. Growth and success are impossible unless this fact is fully recognized.

Prosperity is the common aim of all worth-while industries and, in importance, none exceed the

Electric Railway Industry

Modern requirements dictate efficiency and economy in operation. To satisfy this demand the Westinghouse Electric Company has perfected a line of Standard Railway Motors which practically meet every operating condition.

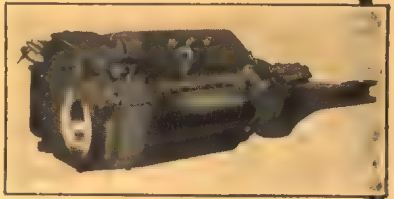
Each Motor embraces all improvements and essential characteristics of known value from an engineering and operating standpoint.

By using Westinghouse Standard Motors every railway company can economically maintain the high operating efficiency so necessary to the success of the industry.

For Interurban Elevated and Subway Service

No. 548 Motor
100 hp.–3175 lbs

No. 333 Motor
125 hp.–3850 lbs


No. 557 Motor
140 hp.–4050 lbs.

No. 567 Motor
165 hp.–4900 lbs.

No. 577 Motor
195 hp. 5650 lbs.

W
WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Vol. 60, *No.* 16 New York, October 14, 1922 *Pages* 623-656

ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE, Editor

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The Importance of the Engineer in Industry

IN a full page advertisement appearing in the New York *Times* for Oct. 6 the McGraw-Hill Company has a message on the place of the engineer. It was addressed particularly to bankers because of the convention in New York during that week of the American Bankers' Association and is one of a series of twelve advertisements picturing the influence of the engineer in the affairs of the world, to which wide circulation will be given by the McGraw-Hill Company, Inc. It is appropriate that a company whose publications have served the engineer through half a century's industrial progress should do this advertising in his behalf. The text of the advertisement follows:

The Place of the Engineer

WITHIN the memory of the elders of today this nation has turned from a land of scattered agriculturists to a compact unit of industrial production. And this in the face of a multiplying population with multiplying food requirements; in the face of increased acreage with increased output per acre.

The change has come through the coming of a body of men known as engineers, who have delivered us from the consuming losses of chance by giving us the science of controlled and direct effort.

These engineers have reduced the proportionate population of the farms through providing the farmer with mechanical means of replacing human labor.

They gave industry impetus through providing it with equipment designed to construct the machinery and other devices required by the farmer, as well as the enlarged needs of a congesting urban population.

They have put machinery to do the drudgery of detail in office, store factory, farm and home. They put methods into management, facts where guesswork had been, knowledge where ignorance had taken toll.

These engineers, of whom we hear so little and upon whom we are daily becoming more dependent, have carried out a successful and constructive revolution which has turned this country into the greatest of industrial nations.

Today they are making themselves felt in the reconstruction of our standards of intercourse, in the improvement of both social and industrial laws, in the betterment of ethical and moral principles.

They have earned this position of influence through having analyzed the purposes of life and evolving a science of progress founded upon fact.

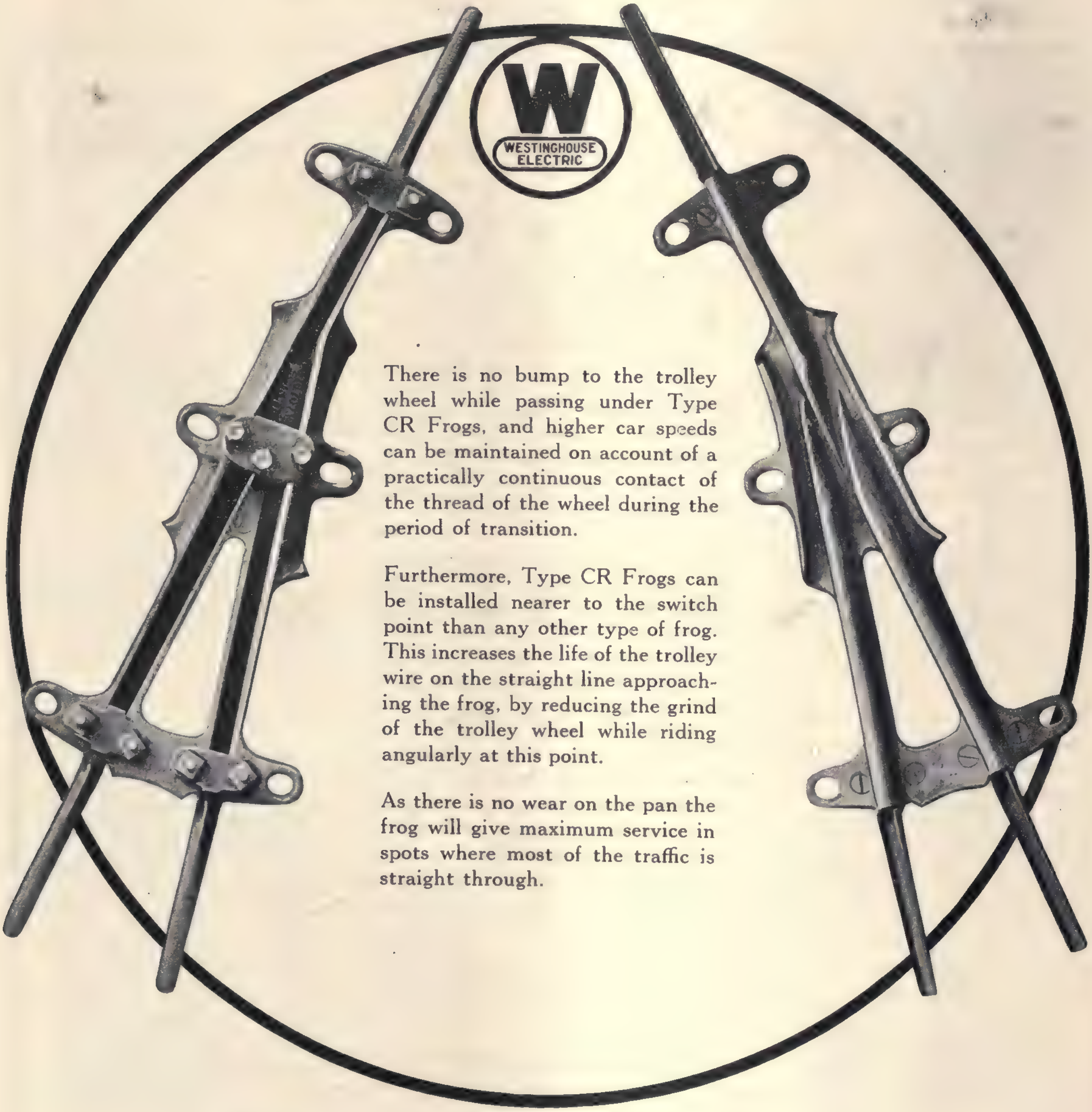
You will do well to follow the activities of the engineer. Your future depends upon him, not merely your financial success but the revaluation of our world and its progress out of chaos into sound prosperity.

The advertisement is signed by the McGraw-Hill Company with a list of the various papers published by it.

Circulation of this Issue, 5,700 **Advertising Index—Alphabetical, 40; Classified, 36, 38; Searchlight Section, 35**

Type CR Trolley Frogs

Made For Both 8° and 15°



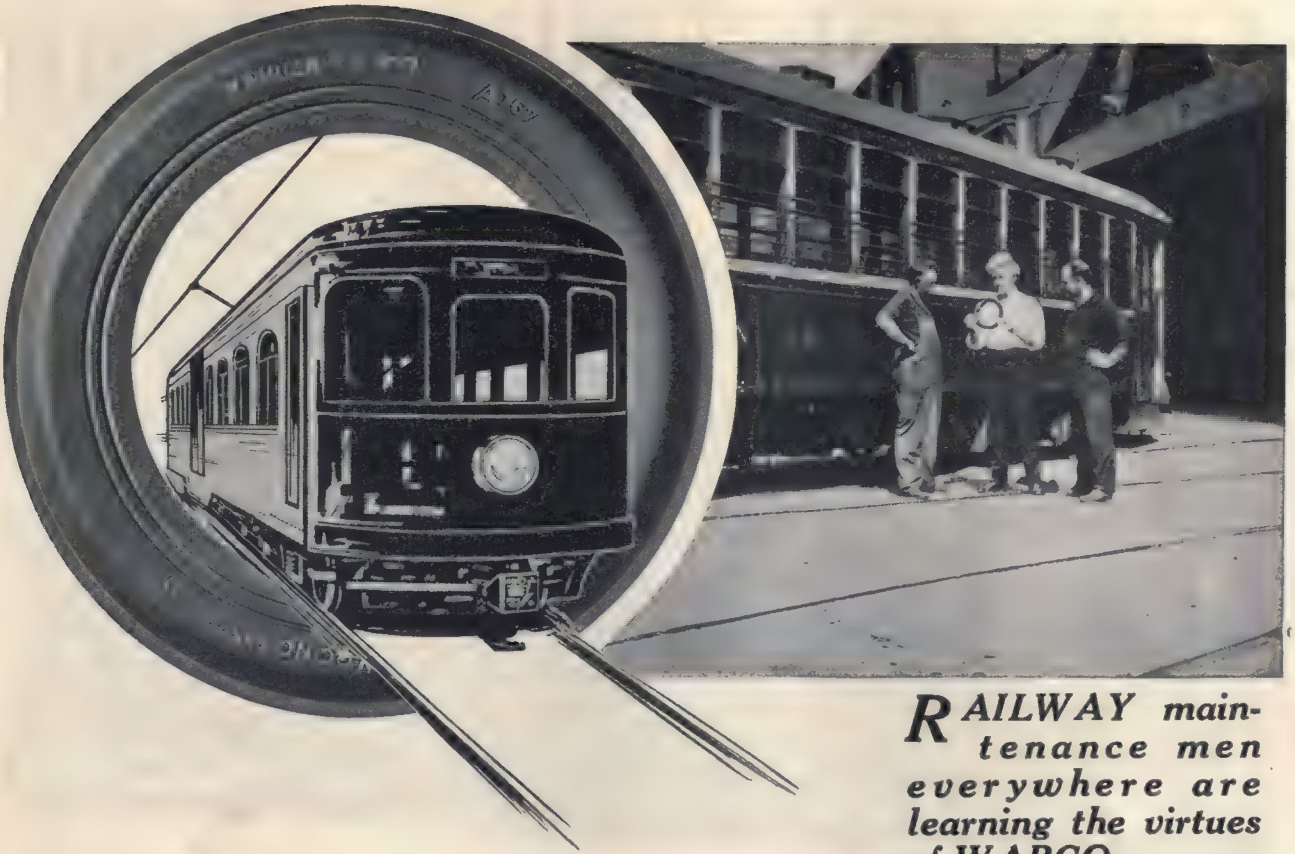
There is no bump to the trolley wheel while passing under Type CR Frogs, and higher car speeds can be maintained on account of a practically continuous contact of the thread of the wheel during the period of transition.

Furthermore, Type CR Frogs can be installed nearer to the switch point than any other type of frog. This increases the life of the trolley wire on the straight line approaching the frog, by reducing the grind of the trolley wheel while riding angularly at this point.

As there is no wear on the pan the frog will give maximum service in spots where most of the traffic is straight through.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa

Westinghouse



RAILWAY maintenance men everywhere are learning the virtues of WABCO.

WABCO

WABCO is the new Brake Cylinder Packing Cup which in two years has upset every precedent for packing cup efficiency and economy.

WABCO simply doesn't wear out under ordinary conditions. It stands up with a firm, resilient body, remains always airtight, is not injured by oil or water, nor affected by any cylinder temperature found in actual operation.

We developed WABCO to give the railway industry a better packing cup *material* and a better packing cup *design* than it had ever known before.

We wanted a packing that would eliminate brake cylinder leakage—and something that would give *indefinite wear.*

WABCO does both!

Westinghouse Traction Brake Company
General Offices and Works: Wilmerding, Pa.

OFFICES:

Boston, Mass.
Chicago, Ill.
Columbus, O.
Denver, Colo.
Houston, Tex.
Los Angeles
Mexico City
St. Louis, Mo.
St. Paul, Minn.
New York
Pittsburgh
Washington
Seattle
San Francisco

WESTINGHOUSE TRACTION BRAKES

Safety Cars in the Orient

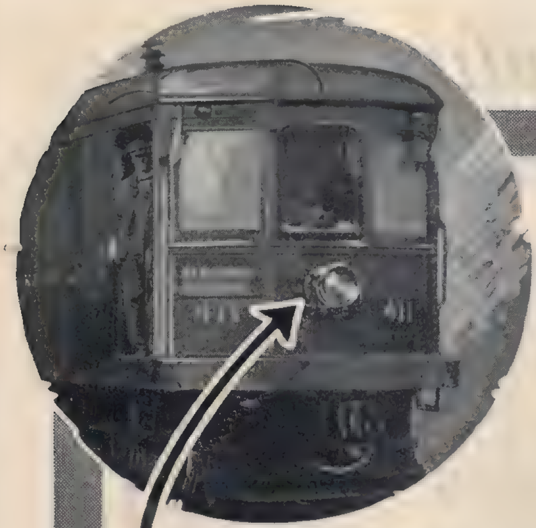
OTHER countries have been quick to see the advantages of the Safety Car.

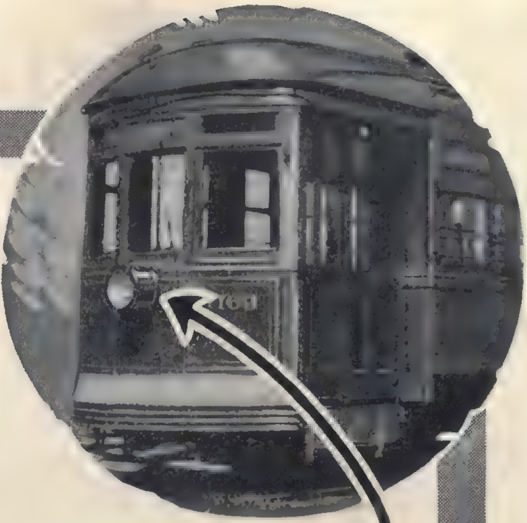
In the streets of the ancient Chinese city of Dairen, under the guns of historic Port Arthur, the South Manchurian Railway is now operating 10 Safety Cars of standard design and American construction.

Just as the Safety Car drove the "jitney" to cover in America, so is it now replacing the picturesque but out-of-date jinrikisha in the streets of Dairen.

We furnish the Air Brake and Safety Car Control
Equipment which *makes* the Safety Car

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH





IMPERIAL HEADLIGHTS FOR EVERY TYPE of CAR

Write out specifications for the ideal headlight for your cars. You will find that one of the many Crouse-Hinds Imperial Headlights will fit your requirements exactly.

You can have an Imperial to deliver any quantity of light you need.

You can get an Imperial of the right dimensions, ready for mounting in any way you please.

Best of all, you will find all types of Imperials are rugged, simple, enduring.

There are various Incandescent, Luminous Arc, Carbon Arc types in the Crouse-Hinds Imperial family. ***Send for catalog.***

The Ohio Brass Company
Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago
San Francisco Los Angeles

Exclusive Sales Agents in the U. S. for Crouse-Hinds Imperial Headlights.

Insurance plus
Marsh & McLennan Service

Have You Finished the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

MARSH & McLENNAN
175 W. Jackson Blvd. Chicago, Ill.

Minneapolis
New York
Detroit

Denver
Duluth
Columbus

San Francisco
Seattle
Cleveland

Winnipeg
Montreal
London

This time make it

"Concrete and Steel Ties"

YOU may have used concrete ballast in Paved Track Construction, but unless you have used the Steel Tie designed especially for this excellent type of track foundation, you have found it expensive and not justified by increased life.

Glance over the specific reasons for the success of Steel Twin Tie Track in the opposite column. If Steel Twin Tie Track represents the highest attainable combination of permanence and economy, of course, you want it for your new construction.

To render full co-operation in your complete investigation of its performance and costs is our desire.

Estimates, cost data and price at your material yard on request.

Reinforced Concrete Slab.

Steel Bearing Plates at 3 foot intervals.

156 sq. in. of bearing per track foot.

468 sq. in. of bearing under every joint.

Reinforced Transverse Beam.

Factor of Safety of 10 in loading of concrete.

12 years of Service under heaviest equipment.

Rail tilting feature for 1 2/3c. per track foot.

6 to 12c. per foot labor cost installed ready for concrete.

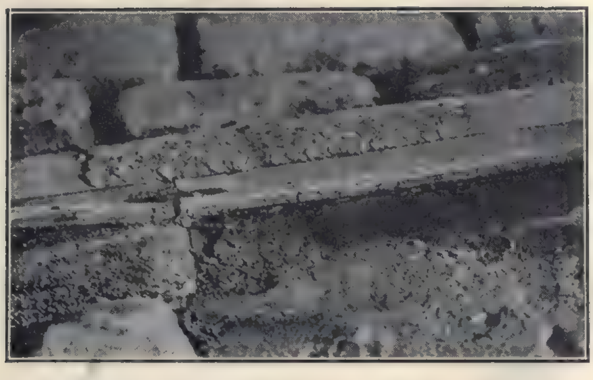
$2000 to $5000 per mile lower in first cost than wood ties in concrete.

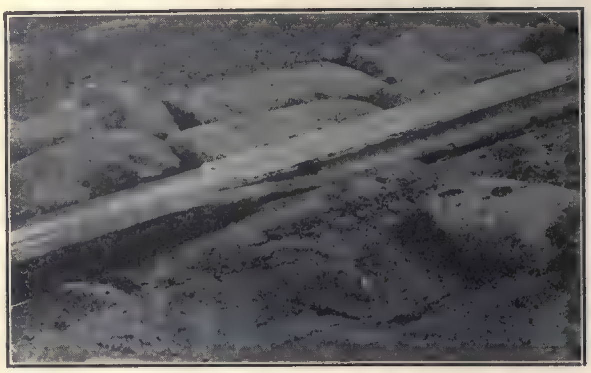
Costs no more than wood ties in rock ballast.

Most efficient tie in point of weight per foot of track.

The International Steel Tie Co.
Cleveland

Steel Twin Tie Track





It doesn't cost much to

Keep Rail Joints in Repair

But it's going to cost a lot of money for rehabilitation and replacements if you let them go to pieces. There is no quicker indication of a run-down, impoverished, depreciated railroad than a truck full of cupped-out and broken-down joints.

By caring for joints at the first signs of trouble, these unhappy conditions can be avoided. Not only is it true that it costs little—it is further true that the cost is saved many times over by postponing the renewal of track for several years. The art of saving joints and special work is now well-advanced, easily learned and inexpensively applied. And we have brought up-to-date, efficient welding and grinding equipment within the reach of every electric railway company, large or small.

Ajax Arc Welder

An outfit suited to the railway of any size. It is easily carried from place to place by two men, and will fit on the platforms of passenger cars. It weighs only 155 pounds.

Its high amperage, even at low line voltages, make it especially desirable for use on outlying lines; when other machines will not make a strong weld owing to poor voltage.

Atlas Rail Grinder

A light, fast grinder, especially adapted to following up the welding gang, smoothing off surplus metal and grinding the run-off on repaired joints.

It is equipped with rubber-tired, de-rail wheels and can be removed from the track to permit passage of cars. Will grind in grooves of girder rails and special work. Electric Motor driven from overhead trolley.

RAILWAY TRACK-WORK CO., 3132-38 E. Thompson St., Philadelphia, Pa.

AGENTS:

Chas. N. Wood Co., Boston
Electrical Engineering & Mfg. Co., Pittsburgh
Atlas Railway Supply Co., Chicago
P. W. Wood, New Orleans

Get ready for Winter Service!

Keystone
Steel Gear Case

Now is the time to think about gear protection and not after the ice and frost begin to raise havoc with your road bed.

Stock up now—with Keystone Steel Gear Cases—for all your cars, irrespective of type of car or motor.

The Keystone line is an extensive line but the same materials and the same high-grade workmanship go into every Keystone Gear Case, large or small.

Keystone means sure gear protection. It also means minimum weight. In short, Keystone is "a real case of real service."

Hundreds of the largest operators in the country know this to be a fact. You should know it, too.

Try a Keystone Steel Gear Case on any type of car.
Write for data sheets.

ELECTRIC SERVICE SUPPLIES CO
MANUFACTURER OF RAILWAY MATERIAL AND ELECTRICAL SUPPLIES

ELECTRIC SERVICE SUPPLIES CO.

PHILADELPHIA
17th and Cambria Sts.

PITTSBURGH
337 Oliver Building

SCRANTON
316 N. Washington Ave.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

One-Man, Two-Man All Around the Town

Good for any kind of service, city or surburban, light or heavy, are these one-man, two-man cars of the Milwaukee Electric Railway & Light Company.

The company has put in all sorts of stunts—there's the idea of employing auxiliary fare collectors who have a special crank to open the rear right-hand door, so passengers can be handled at double speed where congestion exists.

The active all-day doors—those at the front—are air-operated, of course.

With National Pneumatic door engines, of course. The company has hundreds of 'em in train service, too, and knows they're good.

Get Ready for Busy Days
By Installing What You Need of the

National Pneumatic "Rushour" Line

Door and Step Operating Mechanisms
Safety Interlocking Door Control
Door and Step Control
Motorman's Signal Lights
Multiple Unit Door Control

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd.
Toronto, Ont.

National Pneumatic Company, Inc.
50 Church St., New York
McCormick Bldg., Chicago
Works: Rahway, N. J.

Saving Money on Lubrication

"HOW much per gallon?" asks the inexperienced buyer. "I want to save money."

"How much per service unit?" inquires the practical purchaser of lubrication. "That's what I must know to determine true costs."

And which is right? Can service be measured in gallons? No more than wages can be regulated by the *size* of the employe, instead of his ability!

Street railways do not use oil, but *lubrication*—the service obtained from oil. The value of the oil must be gauged by its contents in lubrication units.

There has never been a question of Galena Oil quality. It is universally conceded to be the best. There has been too much proof accumulated through comparative tests with other lubricants to permit any reasonable doubt of the superior lubricating quality of Galena Oils.

Yet there are instances where price per gallon appeals to the purchaser as the deciding factor in buying lubricants, without consideration of the *service* obtained from the gallon.

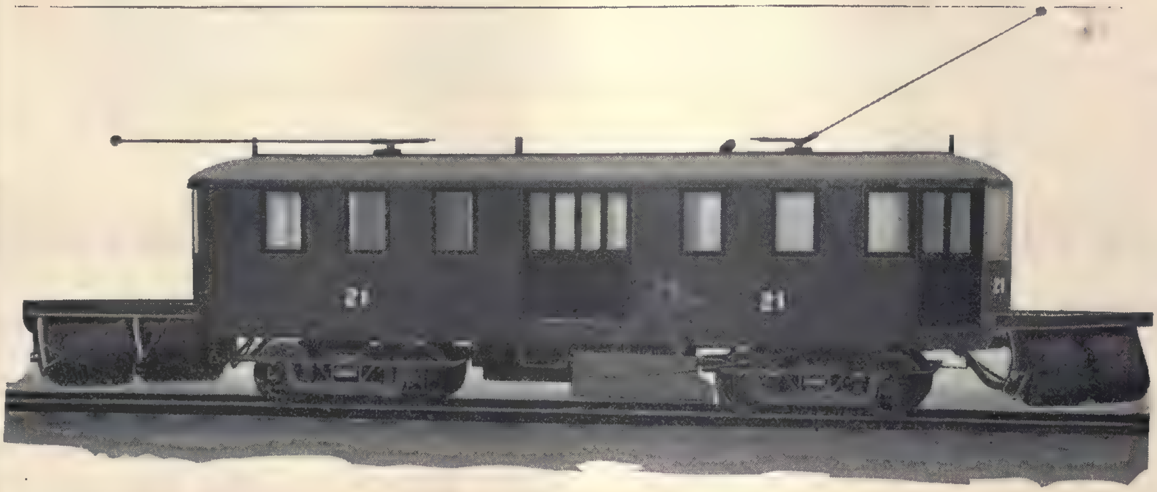
While the cost of lubrication, compared with other maintenance costs in street railway operation, is a small item, its influence in regulating other expenses is most important. Whenever and wherever used, cheap railway lubricants have given inferior service. The cost of repairs and replacements made necessary through their deficiencies, if added to their first cost, would make the price per gallon surprisingly high. The value of the time lost with hot boxes and cars out of service, still higher.

The type of service exemplified on the hundreds of electric railways under Galena lubrication should prove a safe and reliable guide for the purchaser. A comparison of the results obtained, with those on railways using other lubricants, must stand as convincing proof that Galena Oils are not only the most efficient but the most economical as well.

"More miles to the pint;
Better service to the mile."

Galena-Signal Oil Company
New York Franklin, Pa. Chicago
and offices in principal cities

Snow Fighting Equipment



Double Truck, Steel Underframe Sweeper

THE utility and economy of this Combination Snow Sweeper and Baggage, Express and Work Car are obvious. It is adaptable for service in all seasons of the year. Extreme length is 49 ft. 1 in. over the brooms. Exterior width over all is 8 ft. 6 in. when used as Snow Sweeper.

The car body over the buffers, with the brooms removed, when used as a work car is 35 ft. 0 in. in length.

The underframing of the car is entirely of structural steel, sills being 8 in. "I" beams; buffers 7 in. by 3– in. angles. The frame is braced diagonally, making the same very rigid and strong. The super-structure of the car is of wood, of standard baggage car construction. Car is sheathed both inside and out. Roof is of the "turtle deck" type, covered with No. 8 cotton duck.

Brooms and broom-driving mechanism, also the side plows can be readily removed in order that car can be used as express baggage, or work car during summer months.

Blueprints and specifications will be submitted on request.

Selected Snow Sweeper Rattan on Hand, ready for Immediate Shipment.

McGUIRE-CUMMINGS MANUFACTURING CO.

GENERAL OFFICES
111 WEST MONROE STREET
CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars, Snow Sweepers, Electric Locomotives.

Supervisory Control *for* Automatics

What has been mentioned in the circular, as quoted on this page, is already being done in part.

With only two wires from the generating station to the dispatcher's office, complete automatic stations are now being successfully controlled.

The load dispatcher has before him continuously a visible indication of the operating position of the oil circuit breakers on the system, and, by means of simple control keys, can change the switching set up whenever necessary.

Supervisory control for electric power generation and distribution systems will be explained in detail by our nearest specialist.

> *"Millions of dollars are being invested annually in automatic stations. Will one load dispatcher with the aid of automatic devices and wireless communication finally control an entire power system from one point?"*
>
> **A. I. E. E. Circular**
> **announcing**
> **38th Anniversary Convention**

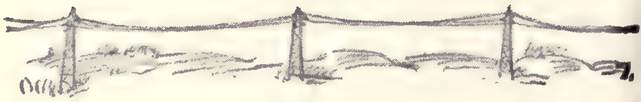
General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

54C-71

Automatic



No Hands—

G-E Automatic Station Control Equipments throughout the world are being entrusted with the entire responsibility of maintaining in operation many important electricity supply systems with but slight supervisory control.

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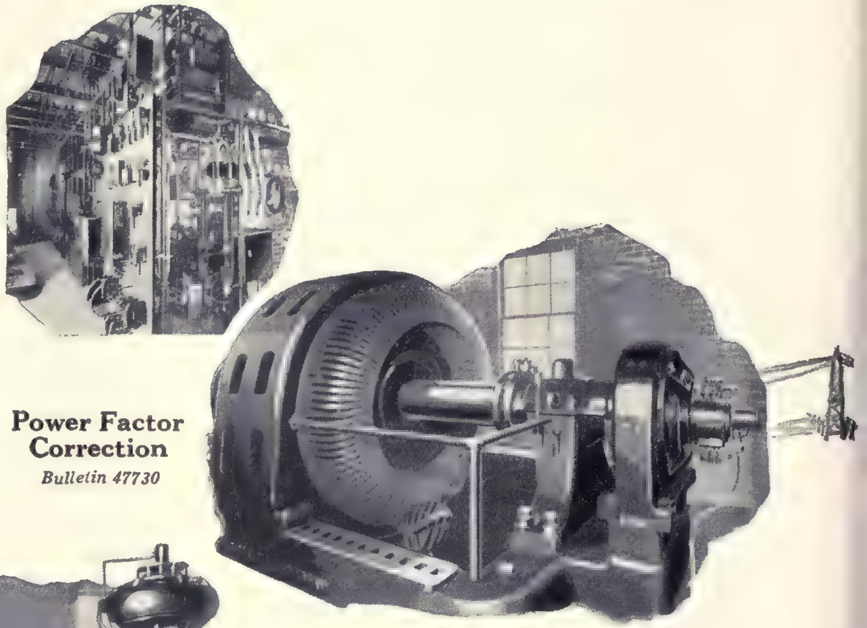

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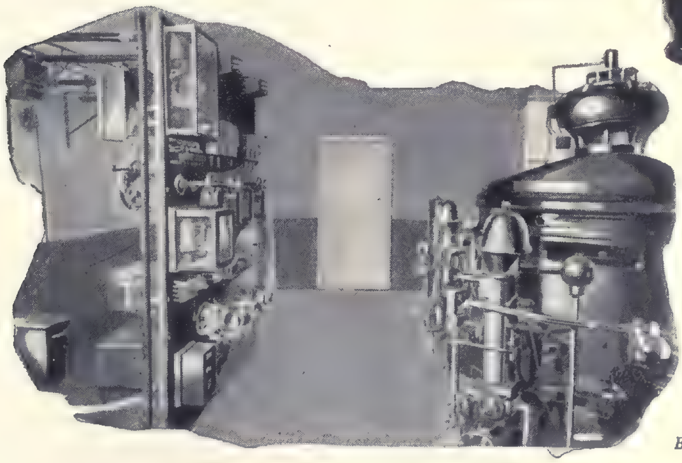

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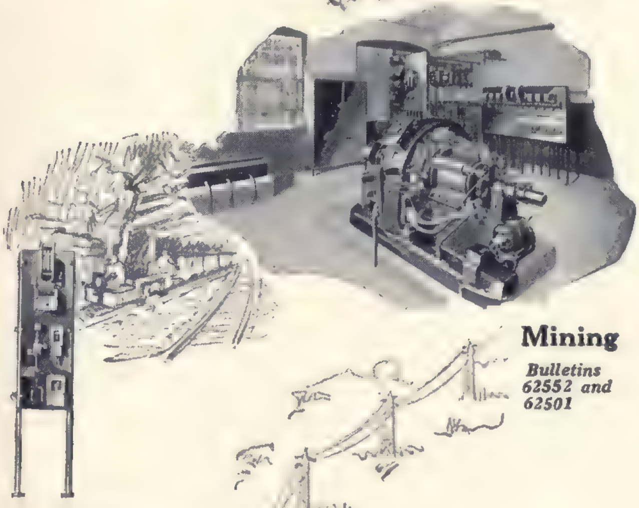

Mining
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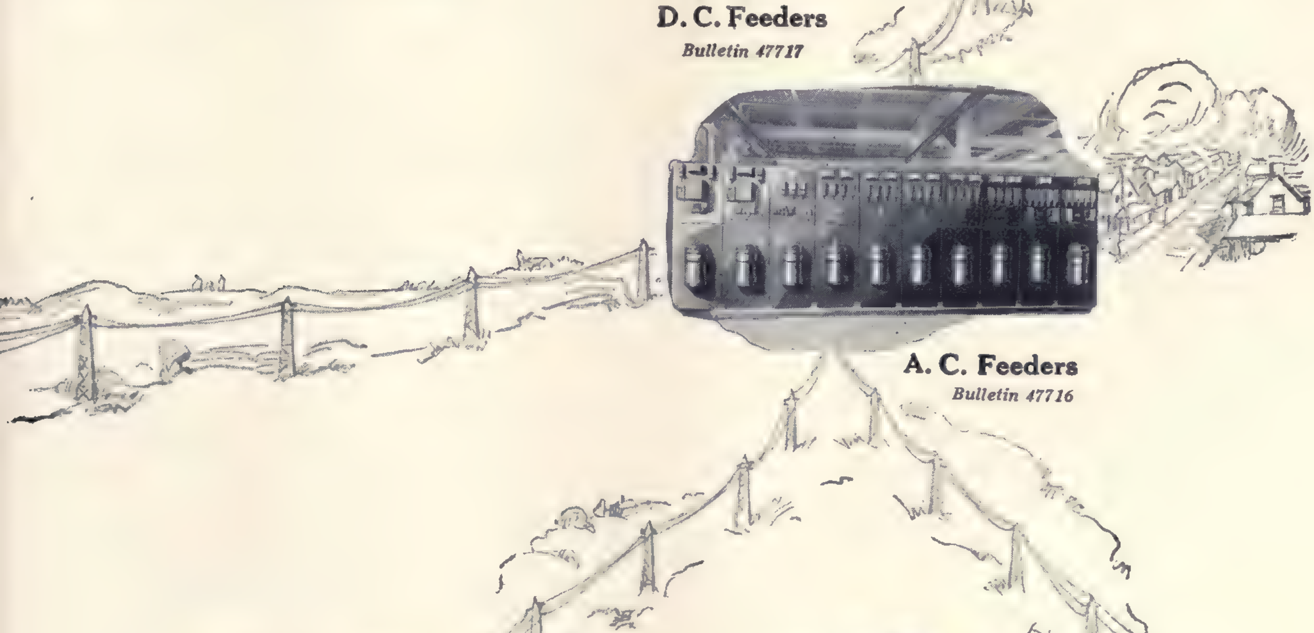
D. C. Feeders
Bulletin 47717



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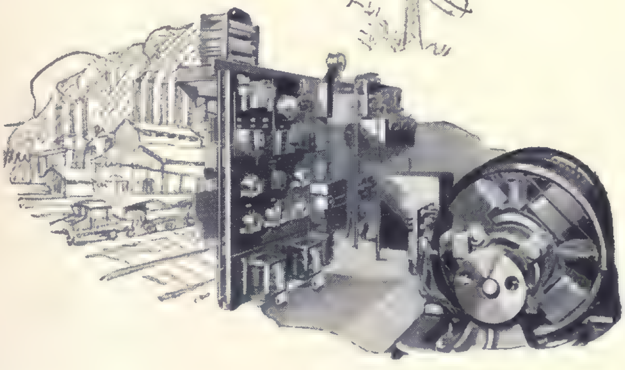
Railway
Bulletin 67712



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ELECTRIC

54C-43

Automatic Reclosing Feeder Equipment

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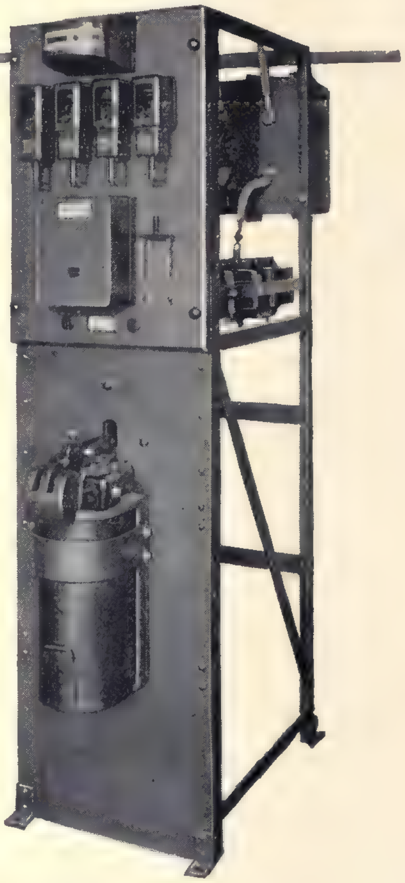

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Automatic D-C. Reclosing Feeder Equipments function as follows on stub end or combined stub and multiple end feeders:

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Keep the load disconnected a definite time regardless of the cause of opening.

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Automatic Reclosing A-C. Equipments are available for indoor and outdoor service. With all devices mounted on a self supporting steel framework, the arrangement is neat and compact.

When the oil circuit breaker trips out on an overload, it will reclose after an interval of from 5 to 30 seconds. If the overload has been cleared, the breaker will remain closed. Should the overload still persist, it will again trip out and reclose as before. Should the overload still be on the line, the oil circuit breaker will trip out for the third time and remain open until manually reclosed and reset.

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The Accountants' and Claims Associations' Programs Compared

THE Chicago convention programs of the Accountants' and Claims Associations are interesting by contrast. The one contained few papers or reports, the other many; the one was strong on co-operative features with other associations, the other practically independent; the one involved a few long papers, the other many short ones. Which plan was better? Which proved more stimulating and informing?

These questions are asked with a view to bringing out suggestions for improvement, for it would be a rare program that would not stand some betterment. The general impression conveyed to those who viewed all the meetings from the outside, so to speak, was that the accountants had too light a program while that of the claims men was overcrowded. The former had some excellent papers, but the opportunity for discussion was not fully utilized. This was partly due to the noise in the meeting room on the first two days. On the other hand, the claims men had so much to say that they couldn't say it all. An average of the two programs would seem to have been about right.

This is all entirely aside from the quality of the material brought out in the papers and discussions, which was excellent in both associations. And after all, the question is one of the good of the industry generally, rather than that of the few, comparatively, who were fortunate enough to get to Chicago. In the long run the best program is that which produces the most helpful information for all the people who do the everyday work of the railway business. It is by this standard that the sessions will finally be judged.

Association Reorganization Has Proved Effective

AT THE 1921 convention of the American Electric Railway Association, a revised constitution was adopted, which put into operation several new provisions for the administration of the association's activities and operations. There was question at the time as to whether these changes in words would result in any actual change in operation and any benefit to the association and its members. The past year has shown, however, that the modifications were good ones and that the officers and committee members have made most of them really effective.

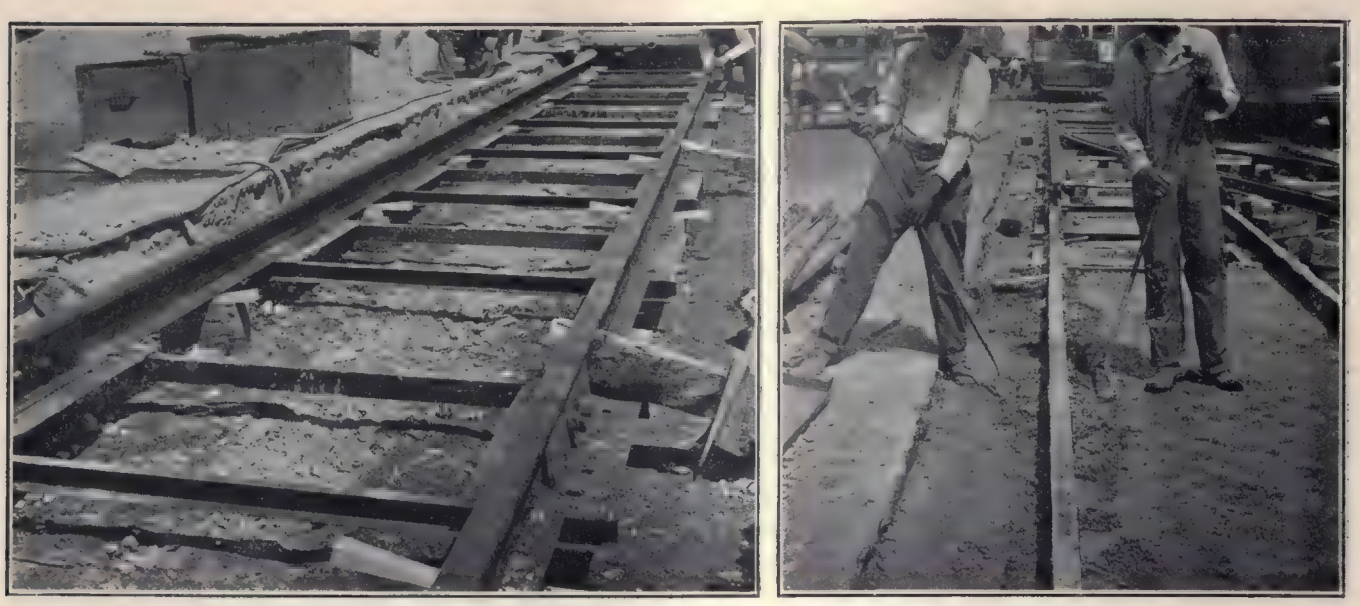
It would not serve any great advantage to trace each change. But surely the association may thank President Gadsden and his reorganization committee for insisting upon regular and frequent executive committee meetings. That, perhaps more than any other one thing, has served to keep the association's "governors" in close contact with association affairs. Its worth has been fully appreciated even by those who were most skeptical a year ago, and while this year the majority felt that nine regular meetings were more practicable than twelve, no one wanted to return to the old order. Another valuable feature has been the six standing committees with their monthly reports. Particularly should be mentioned the finance committee which has placed and kept the business of the association on a secure and unquestionable basis; the public policy committee which has always been ready to advise on questions of policy as they arose, and the publications committee, which in addition to supervising the publication of *Aera* has also dealt with all other publishing problems of the association. These three were all new committees.

There has, it is believed, been a general feeling of more earnest endeavor in, and more careful attention to association duties in most of the other committees as well. This was what was most desired, of course. The constitutional changes made have helped this materially. The association should continue to reap the benefits for years to come.

Increasing Attention Given to Relations with the Public

THE proceedings at Chicago of the American and T. & T. Associations illustrate in a striking way the tendency of the electric railway industry more and more to occupy itself with important sociological topics connected with electric railroading. Ten years ago the papers and reports related largely to technical subjects. This year such subjects were of course considered by these two associations, but probably more effort was given than ever before to viewing these matters from the public side. Such, for instance, was the purpose of the symposium on public relations, conducted by Mr. Brush on Tuesday morning before the American Association, and the discussion on merchandising transportation in the T. & T. meeting on Monday afternoon, with the address by Mr. Hungerford. The other speakers from outside of the industry at the meetings of the American Association, notably Mr. Wheeler and Mr. Jackson, also laid great stress on the effect which good public relations has on traffic, while Judge Warwick spoke particularly of this matter in its relation to the financing of the property at home.

The symposium conducted by Mr. Brush was perhaps the most directly instructive of these events because it brought out the opinions of ten astute railway men, based on their personal experience in improving public relations and keeping them improved. These addresses represented all ways of solving this problem, such as public speaking, newspaper advertising, use of company publications, public utility information committees, etc., and some of the doctrines laid down, particularly by Messrs. Sawyer and Storrs in regard to the relations with the press, would have been considered almost revolutionary at a railway convention two decades, or even one decade, ago. Railway managers in those days used to complain bitterly that their purposes and policies

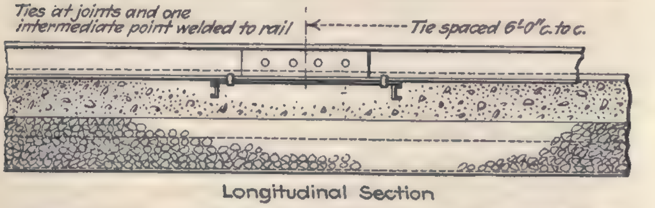


BEFORE AND AFTER POURING CONCRETE, KANSAS CITY TRACK CONSTRUCTION

At left, showing track assembled and surfaced ready for the pouring of concrete. Note holes through base plates which provide vents and facilitate thorough tamping of the concrete under the ties.

At right, track after the concrete slab has been poured and concrete has just taken its initial set. Tampers are at work tamping concrete solidly under plates and rail.

can be avoided. This point must be watched, because after the concrete has set and the track is completed, pockets of this kind, or any space through which the water can work, will become filled with foreign material. Then the jarring of the rail and the plate above the tie which is bound to take place will eventually cause a slight movement and breaking of the pavement. The remedy for this, and a simple one, is care while the concrete is setting. Not only should the concrete be thoroughly tamped with bars underneath the plates at the time it is poured but again, twenty or thirty minutes later, it should have another thorough tamping at the time that it is taking its initial set. The reason for this is that concrete shrinks between the time of its pouring and of its initial setting. Hence, at this time, the concrete should again be thoroughly tamped, not only under the plates but also under the base of the rail. In this way, all water and air pockets are driven out from under the plates and rail, leaving as firm concrete as possible at that time.



Cross and Longitudinal Sections of Solid Concrete Track Used in Kansas City

It will be observed that this working of the concrete leaves outside of the plates a very considerable void which must be refilled with concrete. Hence, the entire surface, after this final tamping, is flushed with the grout, which will fill up all crevices or space that may have been left around the steel ties, thoroughly seal the surface right up to the rail and prevent any seepage which may pass through the pavement from getting into or below this track structure.

The joints used upon this reconstruction are of the Gailor arc-weld type made with the Lincoln welder. After the concrete is set, all the concrete around the joints is removed and the rail is then thoroughly cleaned and welds made. This is done simultaneously with the paving, so no trouble may arise from the expansion and contraction of the rail.

The paving is No. 1 Wisconsin granite 5 in. in depth, laid upon a bed of sand and cement and thoroughly grouted. Proper care was taken in the laying of these blocks so that a very smooth surface was obtained. By ordinary care, with blocks of this grade and a proper grouting, a pavement as smooth as asphalt is the result. Granite block was selected for this work, as it is found to be the highest possible grade of suitable paving and its cost fully justifies its use.

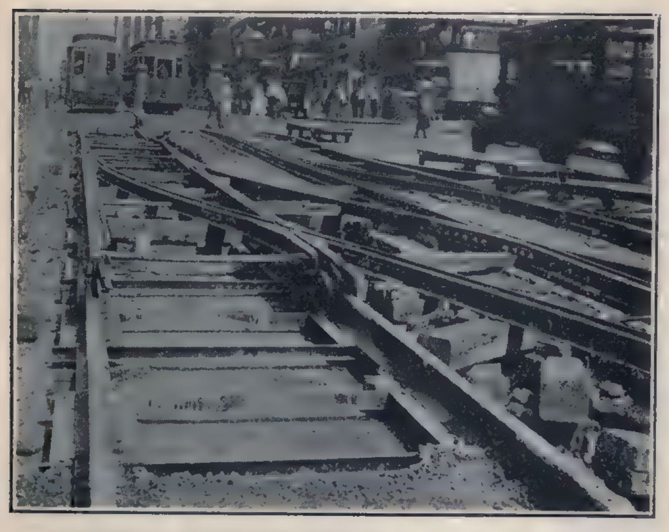
A Substantial Foundation Is Provided

In a construction of this type where every joint, both horizontally and vertically, is sealed with concrete, we have a slab consisting of concrete and granite 15 in. in depth, reinforced in all directions with the steel of the International ties and the rails, and the entire mass both below and above the base of the rail contributing its part to the carrying of the load. One cannot conceive of any kind of load that would be carried upon the public streets, either on a truck or on flanged wheels, that could not be supported and carried by reinforced slabs 15 in. in depth. Failures which have occurred in the past on tracks laid in solid concrete may be attributed to one of several causes. Thus, in some types of construction, the solid concrete base is not integral with the paving and track, and it acts only as a slab and that of not sufficient depth. Wherever conditions of this kind exist, the water gets into and below the paving, and as soon as the paving begins to break up the entire structure is weakened. Other types of solid concrete construction have not had the advantage of the reinforcing that comes through the use of the steel ties. One of the great advantages in this type of construction is that both the paving and the base are so firmly bound together by proper grouting and the reinforcing of the slab by means of the rails and ties that the entire depth of both paving and base contributes to the carrying of the load.

This type of track construction as described has been developed as a result of our experience in the Kansas City Railways over a period of many years, and has been adopted only after the most careful consideration of past experience, good and bad, which other types of construction have developed.

That the 7-in. rail has many advantages over the many eccentric sections that are used is beyond question; that the use of the International steel tie has every advantage over all other types of construction has been demonstrated. For instance, by its use, we have eliminated 4 in. of excavation and concrete, as compared with what would have been required if we had used a standard wooden tie in its place; it is placed with greater facility and less cost; it acts as a reinforcing steel within the concrete slab and gives as permanent a piece of construction as one obtains from reinforced concrete buildings or bridges, and it furnishes a type of track with a minimum of concrete and excavation and insures a uniform distribution of the load over the subgrade.

It is confidently expected that this type of construction will furnish a track that will be good for from twenty to thirty years, practically without repairs or rehabilitation of any kind. This is based upon our experience upon similar work that has been done in Kansas City in the past ten years, where such construction has been carried out with some modifications but where no maintenance of any kind has been required under heavy traffic. In fact, the track is still apparently as good as it was the day it was put down and undoubtedly can be used for many years to come without the least expenditure for maintenance.



SHOWING RECONSTRUCTED TRACK UNDER THE PORTABLE CROSSOVER

This piece of track must be completed under traffic. A concrete slab has been poured below the level of these ties upon which the track will be solidly blocked when the balance of the slab is poured after the removal of the crossover.

Swiss Choice of Single Phase Justified

Consulting Engineer of Bernese Subsidized Railways Shows by Careful Analysis Why the Standard System Used for Heavy Traction in Switzerland Is Well Suited to the Electrification of Steam Railroads

IN A SERIES of articles recently published,* L. Thormann, consulting engineer to the Bernese Subsidized Railways, compares point by point the several systems available for electrification of railroads. His conclusion is that under no circumstances can the continuous-current system be declared superior to the single-phase system. From a purely technical standpoint, both systems can satisfy the requirements of main-line traffic, and the differences between them are unimportant. On the other hand, with continuous current, the capital costs will be considerably higher in consequence of the less favorable conditions of distribution. This disadvantage would remain in the event of the development of the mercury rectifier, by which the lower efficiency of the continuous-current system could be improved. Thus the choice of the single-phase system for Swiss Railways cannot in any way be regarded as a failure, but as a result of present-day experience it remains the proper solution from every point of view.

Ten years ago, said Mr. Thormann, the question of the most suitable system for electric traction on main line railways appeared to be settled, at least for European conditions. The answer was the single-phase system. The war brought railway electrification to a standstill, except in Switzerland, where the effect of the coal shortage produced an opposite result. After much delay the Swiss Railway Administration ultimately adopted single phase officially. Later, however, commissions from several European countries studied almost simultaneously the more important installations in service or under construction. As a result the continuous-current system at 1,500 volts was favored by some.

Mr. Thormann began his analysis with the overhead conductor voltage, regarding which he said that as the current involved would be too heavy to permit electrification with 600 to 800 volts, no matter how desirable that would be, the voltage problem reduces itself to a solution of the purely technical question of sufficient insulation for the different parts of the installation. Since personal contact with a 1,500-volt line may be fatal, it is immaterial from the standpoint of safety whether this or a higher pressure is used. It is not more difficult to obtain a safely insulated overhead system with 15,000 volts than with one-tenth this pressure. Further, experience has shown that with 15,000-volt single-phase systems, properly protected by ample, quick-acting, maximum-current cutouts, it is very rare that serious damage, such as destruction of the conductors, occurs on short circuit.

As to high-tension rolling stock, the magnitude of the overhead pressure has more effect on the locomotive than on the overhead conductors.

Owing to the necessity for a transformer on the locomotive, it would seem that the alternating-current system is inferior to the continuous-current system. However, as the transformer is of the greatest importance for obtaining speed regulation, it may be questionable whether it should really be regarded as a disadvantage. There is very little high-tension apparatus besides the transformer on the locomotive, so that the voltage has but little effect on the safety of working.

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*See *Engineering*, London, issues for July 7, 14 and 21, 1922.

From a technical point of view it is possible to build locomotives and motor coaches with direct current, single phase or three phase to meet the traction requirements of the heaviest and fastest trains. Experience shows that there is not much difference in efficiency of the locomotives with the several systems.

Where traffic conditions demand the extensive use of motor coaches, it is desirable to use a lower pressure in the overhead conductor to obtain rational conditions for the motor coaches, on which only about one-half of the space for the equipment is available as compared with a locomotive of equal weight.

As to costs of the different types of locomotives, the cost per unit weight is practically unaffected by system; hence a comparison of weights affords an insight into relative costs. At the same time the motor capacity and speed must be taken into account when locomotives for similar duty are compared. Three-phase locomotives with no transformers are lightest, requiring from 65 to 85 lb. per horsepower, based on one-hour rating. For single phase up to 15,000 volts and continuous current up to 3,000 volts the weights of recent large locomotives vary from 90 to 130 lb. For similar conditions, European single-phase locomotives for 15 to 16⅔ cycles are somewhat lighter than American 3,000-volt continuous-current locomotives.

As to upkeep this may be assumed to be proportional to the weight of the locomotive, hence should be lower for the three-phase locomotive and about equal for the other two.

Experience on the Bernese Alpine Railways shows that the cost of maintenance of electric locomotives is much lower than that of steam locomotives. The maintenance costs of the locomotives of a well-managed high-voltage single-phase railway should be about the same as those of a high-tension continuous-current railway working under the same conditions.

SINGLE PHASE WITH DIRECT DISTRIBUTION IS MOST EFFICIENT

As to efficiency of the direct current at 3,000 volts produced from three-phase as compared with single-phase at 15,000 volts produced direct and from three-phase, Mr. Thormann gives average values from generator shaft to wheel rim of locomotive respectively as follows: 37½ per cent, 60 per cent and 48 per cent. With rotary converters or mercury rectifiers used in place of motor generators for converting three phase into continuous current, the over-all efficiency of the latter would be about the same as that of the single-phase system with single-phase generation.

As to energy distribution, apart from the disadvantages of a lower efficiency of distribution, those systems in which the energy is converted further suffer from installation costs which are largely unnecessary in other systems. An extensive 3,000-volt continuous-current system needs three to four times as many feeding points as a 15,000-volt single-phase system.

Referring to the Bernese Railways, using single-phase current at 15,000 volts, Mr. Thormann states that this line is fed at Kandergrund and Spiez with single-phase current direct from generators without transformation. If 3,000 volts direct current were used, there would be in addition four substations, at Berne, Zweisimmen, Kandersteg and Ausserberg respectively. The continuous-current system would need about 51,000 kw. additional converting machinery, 340 tons of extra copper for overhead conductors, and 45 miles of additional transmission lines. In this case, the additional cost of energy with continuous-current traction would amount to 83 per cent.

Summarizing, it can be said that the distributing installation for the single-phase system shows much lower capital costs, both in the case when the energy is generated and transmitted in the form of single-phase current and in the case where three-phase energy has to be converted into single-phase energy, though in the latter case the saving is not so considerable.

In conclusion Mr. Thormann takes up the subjects of generation and transmission and inductive interference. In regard to the former he states that where a station must furnish power for traction and for the general three-phase network, the problem is not as simple with single-phase as with direct current. However, while a uniform system for generation and transmission is a theoretical desideratum, no regret need be felt when it is not feasible.

As to inductive interference, after comparing the various methods which are used for mitigating this, he said that with both continuous current and single-phase current the communication lines have to be cleared away from the tracks in order to make room for the overhead conductors. If the circuits cannot be moved more than about 200 ft. away, shorter distances are permissible, in which case a comparatively cheap compensating wire is necessary with the single-phase system to neutralize static induction. Re-erecting the communication lines will cost about the same with either system.

As regards the devices to be used in the power circuit, the cost only becomes appreciable when with single-phase traction the three-wire system with auto-transformers is used, and to a lesser extent suction transformers, to reduce dynamic induction. With present-day experience it is not permissible to conclude that the single-phase system will be more costly than the continuous-current system on account of interference with communication circuits to such an extent as to outbalance the other advantages of the high pressure.

Power Supply for British Electrification

AN INTERESTING question which has recently been argued before the British Electricity Commissioners has to do with the power supply for the approaching electrification of the South-Eastern & Chatham Railway. This railway will form a part of an electrified group consisting also of the London & South-Western and the London, Brighton & South Coast Railways. The South-Eastern & Chatham electrification will be direct current, and the first stage of the electrification is expected to be completed by June 30, 1925. Arrangements have been made with the government treasury for a guaranteed loan of about $30,000,000, most of which is to be expended on electrification.

On the matter of power supply, the railway applied for permission to construct immediately a 60,000-kw. generating plant, which it was contended could later be extended to produce 150,000 kw. After having made exhaustive inquiry, particularly as to the ability of central stations to furnish a reliable and ample supply of power to the railway, the commissioners concluded that it would be a gain to the public interests concerned if the railway company were to take its supply from an outside source. The commissioners also recommended that the railway immediately take up with the central stations the terms of the contract, including a guarantee to indemnify the railway in case the central station fails to furnish the supply by the required time.

Kiddies' Picnic at Swope Park

Starting the Homeward Journey

Making Friends of the Children

Railway Enters Into Spirit of Civic Movement by Supplying Free Transportation to Swope Park to Children of City

THE Kansas City (Mo.) Railways performed a task recently that while remarkable in itself was in fact only one feature of a remarkable occasion. The occasion was "Mayor Cromwell's Kiddies' Picnic," a picnic for all the children of Kansas City, Mo., "everything free" to children, held at Swope Park, the 1,300-acre public park at the edge of the city. While possible danger had been predicted because of the presence of so many children in the park, the chief anxiety seemed to be concerning their transportation. As it turned out there were no grounds for these fears.

The date was set for Sept. 2—school to begin on Sept. 5. The receivers for the railway entered heartily into the program for the picnic. As its contribution, the company distributed free tickets for all children under twelve years of age. Posters announcing this offer were displayed in the cars several days before the picnic, as shown in the next column.

The special tickets prepared for the children were in two sections, one for the trip to the park, another for return. They were good only until 6 p.m. of the day of the picnic. The receivers prepared 85,000 of these. Committee members, mostly women, distributed the tickets over the city, direct to the homes.

The tickets served one especially useful purpose: they provided a concrete means of showing, beforehand, the willingness of the company to participate in the plan and to co-operate in carrying it out. As a matter of fact, tickets were not required for the day, since the children would have been carried free. Indeed, many children were carried without having to show tickets. But the cards were a useful and welcome means whereby the women working for the picnic were able to be sure that the children were going to have transportation. Hundreds of children might not have gone, had there been any doubt of the free ride.

To the Children of Kansas City

Our contribution to childhood joys at Mayor Cromwell's Picnic, Sept. 2, is complimentary tickets for the children to Swope Park and return. We wish every child a happy and joyous day.

Fred W. Fleming
Francis M. Wilson } Receivers.

Statement Made to Children by Receivers

The crowds began arriving at Swope Park as early as 7:30 o'clock in the morning; in numbers increasing toward noon. The exodus from the park began about noon, and continued until nearly 9 o'clock. All told, there probably were considerably more than 100,000 persons, including men, women and children, in the park during the day; for not only did the children come, but most of them were accompanied by mothers and older sisters, and there were literally thousands of babies in arms.

The Kansas City Railways has a "loading pen" at the

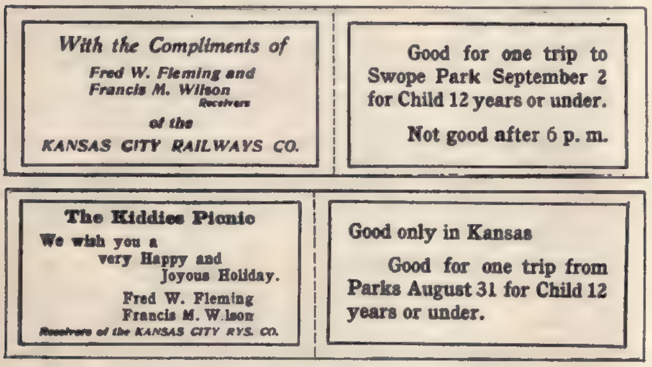
Loading Scenes at the Kiddies' Picnic, Kansas City, Mo.

Swope Park terminus, but a special loading pen was built at the park entrance for this day, with space for two cars. At noon, when it became apparent that the crowd in attendance would by far exceed in numbers the original estimate, the company quickly extended the pen to inclose seven cars. Seven turnstiles were provided for permitting admission to the stockade. Between 12:30 and 7 o'clock Saturday afternoon, 50,000 passengers with tickets were registered by the turnstiles. It is estimated that about 10,000 others boarded cars before or after the cars were in these loading pens. There were people to the number of 25,000 to 50,000 who came to the park and left in motor cars. There were probably 10,000 children less than six years old who rode from the park and were not counted at all.

The company had men in the park to sell tokens, ten men standing near the loading pens for this purpose. There were thirty other employees around the loading place, facilitating the movement of passengers.

TEMPORARY REROUTING A FEATURE

The company routed through to the park many of its lines that ordinarily transfer passengers to a special Swope Park line. A total of 1,025 cars carried passengers to the park. For several hours as many as sixty cars entered the park in an hour. At one time in the afternoon cars were being dispatched at the rate of eighty an hour—this being possible because of the seven-car loading pen, the prepayment of fare, and the efficient work of the extra men who facilitated the loading.



With the Compliments of
Fred W. Fleming and
Francis M. Wilson
Receivers
of the
KANSAS CITY RAILWAYS CO.

Good for one trip to Swope Park September 2 for Child 12 years or under.

Not good after 6 p. m.

The Kiddies Picnic
We wish you a
very Happy and
Joyous Holiday.
Fred W. Fleming
Francis M. Wilson
Receivers of the KANSAS CITY RYS. CO.

Good only in Kansas

Good for one trip from Parks August 31 for Child 12 years or under.

SPECIAL TICKETS USED IN CONNECTION WITH KIDDIES' PICNIC

In addition to the forty extra men at the park, there were also thirty-five additional men serving at transfer points in suburbs and downtown.

Throughout the whole day, over the many lines where the children were carried, not an accident occurred. There were accidents on the system, as on any day; but they did not happen at the park, or in connection with the carrying or transfer of the children and the picnic crowd.

Despite the burden of carrying the thousands of children, the maintenance of the extraordinary headway, and the obvious withdrawal of part of the normal downtown traffic, the company's receipts from passengers were considerably above $3,000 in excess of corresponding days.

A similar "Mayor's Picnic" was held in Kansas City, Kan., on Aug. 31, Mayor Burton of that city being host to the city's children. The Kansas City Railways also provided free transportation for those children—12,000 tickets similar to those used in the Missouri city being distributed.

Illinois Central Project Under Way

With Electrification System Decided, I. C. Will Push Work Involving Detail Electrical Design, Construction of New Terminals, Rearrangement of Tracks and Installation of New Signal System

THE report of the commission appointed to consider the electrification of the Chicago terminals of the Illinois Central Railroad has not yet been released for publication. However, as mentioned last week, the commission recommended the adoption of the 1,500-volt d.c. system with an overhead contact system of current collection. This commission was appointed by President Markham in December, 1920, in accordance with the requirements contained in the Lake Front ordinance of July 21, 1919. The members of the commission are D. J. Brumley, chief engineer Chicago Terminal Improvement, chairman; Hugh Pattison, Bion J. Arnold, George Gibbs, Cary T. Hutchinson and W. M. Vandersluis.

The ordinance, to which the city of Chicago, the Illinois Central Railroad and the South Park Commission were parties, settled the common boundary lines so long under discussion, provided for additional subways and viaducts across the railroad north of Fiftieth Street and bound the Illinois Central to extensive improvements, including a new station at East Roosevelt Road and the electrification of certain services.

The electrification requirements are as follows: (a) The entire suburban passenger service on or before 1927. (b) The entire freight service north of East Roosevelt Road on or before 1930. (c) The entire freight service within the city limits on or before 1935. (d) The through passenger service within the city limits may, with certain provisions, be electrified by 1940.

In analyzing present electrifications the commission found, according to the statement issued by the Illinois Central, that most of the installations in this country had been for some particular type of service or to meet some special operating requirement but have not included freight, through and heavy suburban passenger service.

The New York Central was primarily electrified on account of the Park Avenue tunnel and covers through and suburban passenger service. This is a low-voltage direct-current system with a third rail. The Norfolk & Western, an 11,000-volt single-phase alternating-current electrification, is principally for heavy freight service over mountain grades. This electrification uses an overhead contact wire. The Pennsylvania and the Long Island at New York City were made necessary on account of the tunnels and include only through and suburban passenger service. These electrifications use a third rail for current collection. The New York, New Haven & Hartford, electrified shortly after the New York Central, is the first large example of 11,000-volt single-phase alternating-current electrification and the only example which handles electrically through-freight, through-passenger and suburban-passenger service. It uses an overhead contact wire. The Chicago, Milwaukee & St. Paul, with the largest route mileage of electrification in the world, is a 3,000-volt direct-current system with an overhead contact and handles through passenger and freight but has not a dense traffic.

The Illinois Central problem, involving as it does a heavy suburban passenger service, freight transfers between yards, switching in congested yards and eventually through passenger movements, all within terminal limits only, is quite different from any electrification so far undertaken either in this country or abroad.

The commission considered but early eliminated from the discussion three possible schemes. These were the three-phase alternating-current system, which requires a double overhead contact and which was eliminated on account of complications in construction without any advantages over the single-phase alternating-current system; the storage battery locomotive, which had to be eliminated on account of prohibitive operating charges; the Diesel engine locomotive or some other form of self-contained unit to meet the ordinance requirements as to noxious gases and noises. Some form of the latter type of unit may be developed for freight and through passenger movements, but the development is in such a stage that it could not be depended upon for the Illinois Central.

This investigation left four systems for consideration: 750 volts direct current with third rail; 1,500 volts direct current with overhead contact; 3,000 volts direct current with overhead contact, and 11,000 volts alternating current with overhead contact.

Estimates of first cost and maintenance and operation estimates covering these four systems were made. Although the 750-volt system did not differ materially in first cost and annual cost from some of the other systems considered, yet it was eliminated on account of the large amount of freight yard tracks involved where the third rail was considered undesirable, and also on account of the track location where Chicago climatic conditions would seriously hamper operation with third rail.

Of the three systems using an overhead contact, the 1,500-volt system seemed best to the commission for this particular problem, the electrification of the Chicago terminal, as no main line divisions were involved.

Before actual electrification construction work can be started a large amount of preliminary trackwork must be done. At the present time work totaling about $1,000,000 is under contract and in progress. This consists of track depression work between Twenty-fifth and Forty-fourth Streets, which involves the moving of more than 600,000 cu.yd. of earth; elevation work between Forty-fourth and Fifty-first Streets; the construction of the Rhodes Avenue and Woodland Park Sewers; a dam at Twenty-third Street to allow filling of the property north of the dam, and a new breakwater between Twenty-ninth and Thirty-first Streets.

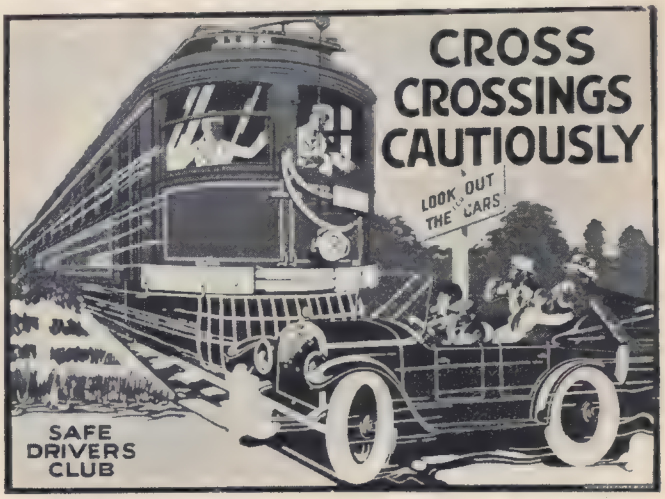
This will be followed by the rearrangement of tracks, as the suburban tracks will be consolidated on the west part of the right-of-way; the erection of the new through passenger terminal at Randolph Street; changes and additions to present suburban stations and platforms with entrance and exit subways where needed; and the elimination of grade crossings with other railroads.

In the meantime the design of the new electrification work will be carried forth. This includes a power house, with a proposed location on the Calumet River near Riverdale, substations to be located at various points on the terminal property and extensive overhead construction work for contact and transmission wires. At the same time the selection of the electrical equipment for the 240 multiple-unit cars will be made. These cars will be similar in design to the twenty new all-steel suburban coaches purchased in 1921 and now in use in steam service. They were built with the electrification plans in mind, and can be converted for multiple-unit operation by the application of motors and other necessary electrical equipment.

The changes in tracks and electrification of tracks, amounting to 125 miles, will require several new interlocking plants and a complete new signal system, as the present one is not adapted to tracks where electric propulsion is used. Furthermore extensive improvements must be made in the telephone and telegraph system, involving several miles of underground conduit construction, to suit the new physical and operating conditions.

Emphasizing Safety in Milwaukee

AT THE RECENT meeting of the National Safety Council in Detroit the Milwaukee Electric Railway & Light Company placed on exhibit one of its "cross crossings cautiously" posters, which was commented upon favorably by a number of the delegates. The reproduction herewith does not do justice to the original, which is impressive and has high visibility because of the vivid colors used. These posters, which are printed on ⅛-in. cardboard, are mounted upon a wood backing. This is placed on a regular fence post at a location between 100 and 200 ft. from the intersection with the interurban line. In order that they may be visible from the headlight of the automobile the height from the top is from 4 to 5 ft. above the road surface and they are turned at an angle of 60 deg. from the line of travel. The posts are usually set about 4 ft. from the concrete, depending upon the width of the road shoulder at that point.



A SAFETY POSTER WHICH IS USED AS A CROSSING WARNING SIGN

It is the belief of the safety committee of the Milwaukee company that this poster carries a lesson which will make it more effective to drivers than is the standard railroad crossing sign which is located about 300 ft. back from the crossing. Even though the driver of a car may not take in the details of the horror expressed on the faces of the passengers in the ill-fated auto depicted, it is expected that he will have this thought brought to his mind because of having seen the American Railway Association posters, which are so widely distributed.

These posters are expected to stand up for at least two seasons. The oil colors are protected by a coat of varnish. The poster itself measures about 19x26 in.

Letters to the Editors

Mayor Couzens Is Not Perturbed

OFFICE OF THE MAYOR

DETROIT, MICH., Sept. 28, 1922.

To the Editors:

In your issue of Sept. 16, 1922, there is an editorial, which has been drawn to my attention, entitled "Mayor Couzens Scents a Conspiracy."

Yes, the Mayor did come up from the ranks, even though he always wore two suspenders.

No, I have not learned that labor by and large is ungrateful, because I cannot learn what is not so.

No, I am not perturbed, because I trust the men if they are honestly informed.

No, I do not see labor turning against me. I have no idea that they will do so.

No, the men of the Amalgamated do not threaten to turn on me and bite my hand. These same men did not bite the hand of the Detroit United.

One great thing I have learned is that the people in the pay of the electric railway corporations cannot fool the public by writing such material as this article contains. Many subterranean methods have been used by editors in an endeavor to fool the public, but I have learned that they cannot "get away with it"; not even those who rise from one suspender, and still have only one. JAMES COUZENS, Mayor.

Freight Haulage Not Discussed at Chicago

BONNER RAILWAGON SYSTEM

NEW YORK, Oct. 9, 1922.

To the Editors:

Glancing over the eighty-eight pages of the issue of Oct. 7, I find the report of the Chicago convention, but little if anything is recorded in the addresses, symposiums or formal papers on freight haulage as a means of increasing receipts. Truly, in the past freight haulage has been held in high regard, even though largely misunderstood in many minds as to its great value under proper nourishment and better encouragement.

I am going to tell you something that might have been interesting reading, at least to some who attended the convention, and who think along similar lines.

I have been privileged to read a letter from one of the largest urban electric railroad systems, whose name I withhold pending its consent, under date of Sept. 20, 1922, which in part says:

"The company has recently withdrawn entirely from the freight trolley business."

Such a quoted statement might ordinarily pass without notice, but because the announcement comes from the largest urban trolley system, operating as it does some 600 miles of tracks and in the year 1919 did move 65,224 gross tons of freight, it is vital to measure the underlying condition which decided the company, as its action bears upon freight haulage on electric railroads generally.

I have before me a bound copy of a study covering the freight department operations of the same system. It is for the year 1919. The expense thereof was provided jointly by a leading utility equipment corporation and by the transit company. The study was directed by a transportation expert engineer of broad experience and covered continuous research for a period of fourteen months. This report is unusually comprehensive; probably none of the character ever equaled it. It contains 167 typed pages, besides many maps, blueprints, recapitulations, which show the company's investments, physical and mobile, the earnings and expenses of freight operations. There is study to show what facilities are necessary, in the judgment of the engineer, to improve efficiency. The report includes all the transportation lines centering at the port, and to co-ordinate therewith the facilities in the metropolitan industrial district. The report says in part:

> The future possibilities for a greatly increased freight operation are without limit, in that the traffic is waiting more extensive developments making possible the transportation of commodities for from 80 to 100 miles outside of the city. The great industrial center which this commonwealth forms is contributory through very heavy traffic possibilities; also owing to the large number of firms distributing their products from the city, a heavy traffic in merchandise, which always pays a good revenue, is waiting development.
>
> A study of the compilations made by correspondents in the Middle West regarding the terminal and road haul costs proved remarkably interesting and showed a surprising difference in operating cost as between interurban railways and steam railroads. It is manifestly clear to us that terminal costs remain constant for all distance, while the road cost increases in ratio of the distance moved. The six mid-west exhibits submitted show the average terminal cost per ton is $0.7108, while the average of the ton-mile cost for haulage is $0.0316. After study of the evidence touching these exhibits, we are convinced that the average terminal cost is in excess of the average shown by the exhibits, while the average of the ton-mile cost as submitted is approximately fair and reasonable.

It seems plain enough what decided the drastic action of abandoning all freight haulage by the transit company when one reads into the report and finds that the average net revenue from freight haulage per car-mile was $0.076, while the station handling cost was total $88,146.39; or, averaging as deduction from otherwise available income revenue amounted to $0.484 per car-mile. The average hauling expense was 40 cents per car-mile. Total car-mile expense was $0.884.

That the commercial and shipping interests of the city in question have not taken kindly to the determined movement by this electric railway system is reported in recently broadcasted press dispatches. The Chamber of Commerce of one of the large outlying cities, and a terminal of one of the lines of electric railways which also connects with the system that has tabooed freight haulage, gives publicity to the fact that it strongly protests the abandonment of freight haulage since the result means not only the diverting of freight and freight revenue benefits from all connecting cities within the state, but has diverted such benefit to an outside state; further, that an appeal from such action had been taken to the State Public Utility Commission.

It would appear, therefore, that the only hope for successful freight haulage by the trolley lines lies in the minimizing, even to a partial elimination, of the terminal handling cost, since I have shown that this station expense exceeds the hauling cost; otherwise, what can all the other electric railroads finally do than to follow the policy as laid down by the transit company in defense of their invested capital. Moreover, the question naturally arises, why should there be further support of the policy of freight haulage on electric railroads, as it must be conducted under present heavy terminal cost handicap, with the haulage equipment and tools that are today in general use. JOSEPH C. BONNER.

Lubrication Data from Lexington

KENTUCKY TRACTION & TERMINAL COMPANY

LEXINGTON, KY., Sept. 27, 1922.

To the Editors:

Replying to the request by A. B. Creelman, master mechanic Youngstown Municipal Railway, Ohio, for further information relative to method of car lubrication and costs of the Kentucky Traction & Terminal Company, described in a communication from me on page 138 of your July 22 issue, I submit the following:

ROLLING STOCK—APRIL 1 TO AUG. 31, 1922

No. Cars	Type	Light Weight lb.	Service
37	Single truck	26,000	City
10	Double truck	25,000	Interurban (New, Feb., 1922)

Equipment	General Electric			WH	Total
Motors	58	67	264	92	
No. in service	46	6	40	22	114
Air compressor			CP-27		
No. in service			10		10

LUBRICATION DATA—PERIOD OF TIME COVERED—APRIL 1 TO AUG. 31, 1922

	Mileage	Gal. Car Oil	Lb. Gear Grease	Total Cost	Cost per 1,000 Miles Cents	Miles per Gal. Car Oil	Miles per Lb. Gear Grease
City	414,175	166.5	242	$49.31	11.9	2,487	1,711
New interurban	358,121	68	107	20.94	5.8	5,266	3,347
Total average	772,296	234½	349	$70.25	9.09	3,294	2,213
Wool waste used.........50 lbs.				$10.20	1.32		
Total cost per 1,000 miles (inc. waste)					10.42		

LUBRICATION COSTS—NINE MONTHS ENDED MARCH 31 1922

	Miles	Cost	Cents per 1,000 Car-miles
City	716,169	121.46	16.96
Interurban	544,694	126.53	23.
Total	1,260,863	247.99	19.

Hot Bearings—April 1 to Aug. 30, 1922

	Journal	Armature	Miles per Hot Bearing
City	6	0	82,835
Interurban	0	0	358,121*
July 1, 1921, to March 31, 1922			
City	10	0	71,616
Interurban	16	0	34,043

Method of Lubrication

Kind of lubricant—Galena Signal Oil Company Products
One (1) gill oil per oiling—Armature—motor axle bearings and journals
One (1) lb. gear grease each gear—except GE-264-½ lb.

*This mileage was covered without any bearing trouble.

	City Service			Interurban Service
Type motor	GE-58	67	WH-92	GE-264
Days Between Oiling				
Armature bearing	7	7	15	10
Motor axle bearing	14	14	15	20
Journals	60	60	60	60
Gears	60	60	60	30
Average miles per day	102	92	98	234

On the old grease-box type of motors (namely, the GE-58 and 67) we use felt in the bottom of the grease box. This felt touches a piece of felt fitted in the bearing sleeve. The grease box is packed with wool waste. The oil well in the lower half of the bearing housing has a felt oil-feeder with a flat spring to hold the oil feeder in contact with the shaft. This applies to both armature and motor axle bearings. The waste in the journal bearings is livened up with a packing hook every thirty days. The oil feeders are inspected every four months.

All oiling is done by a schedule which is made out the first of each month and specifies the car number and particular type of bearing to be oiled each day. The type of bearing to be oiled is designated by the figures 1-2-3-4 opposite the car number.

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1 Designates armature bearing only
2 Designates armature and motor axle bearings only
3 Designates armature motor axle bearings and journals
4 Designates all bearings and gears.

An allowance is made of one day before or after date specified if the car is not in the shop on the date scheduled. This is to prevent cars being taken out of service for the purpose of oiling. All oiling is done in the daytime. A daily report is made by the shop foreman and a record made of each car oiled.

In explanation of the cost of 4.3 cents per 1,000 car-miles for lubrication referred to in my communication in the issue of July 22, this covered only new lightweight interurban cars for the month of June, 1922.

I trust I have made my practice in lubrication clear. I cordially invite comments or criticisms from any fellow craftsman.

W. G. STUCK,
Master Mechanic.

Is a Ferris Wheel Ride Worth More Than a Trolley Ride?

CHARLOTTESVILLE & ALBEMARLE RAILWAY

CHARLOTTESVILLE, VA., Oct. 4, 1922.

To the Editors:

I have just finished reading in a monthly paper devoted to certain branches of the amusement business an editorial on the relative advantages of charging 10 cents, 15 cents or 20 cents for a ride on a ferris wheel. This prompts me to ask: What are the psychological processes which lead men and women to fight for an opportunity to pay the ferris-wheel man 15 cents and 20 cents for a ride and begrudge the street car men 7, 8 or 10 cents?

This query of mine is not the outgrowth of disappointment because our travel has fallen off with increased rates. You will remember that the Charlottesville & Albemarle has not only never increased its fare above 5 cents, but it has been showing gratifying gains in patronage each month.

But I have seen it in almost every walk of life, and I have wondered if it is a psychological application of the inverse of the proposition that we like to get something for nothing. I have noticed a decided willingness to grudge the necessities of life, but a greater willingness to pay dearly for the luxuries. Should you not class a 15-cent or 20-cent ferris-wheel ride as a luxury? And have we not come to regard a street car ride as a necessity? Or is it all mixed up with the "great unrest" —the doubtful cause for every vice and extravagance uncurbed since the war?

JOHN L. LIVERS, President.

Outing of Monongahela Divisions

WITH fair weather prevailing the day forces of the Fairmont and Clarksburg divisions of the Monongahela Power & Railway Company enjoyed a great outing at Norwood Park, Clarksburg. The night forces had their outing the day following. Nearly 2,000 people attended the picnic the first day and more than half that number the second day. Mr. and Mrs. W. M. Bostick and Vice-President C. P. Billings were the West Penn Company representatives at the gathering. George M. Alexander presented badges to veterans who had been in the service of the company for twenty years or more. A program of dancing and sports featured both days.

Among recent effective epigrams put out in the posters of the Ontario Safety League, the following attract attention: "The man on the job knows best what is safe and what is unsafe." "Whether you are a safety committee member or not, it's up to you!" "Take no chances—If you have to mourn the death of a mule, mourn at his head." "Blind men seldom pay an income tax—Wear your goggles!"

Accountants' Association Proceedings

The Three Outstanding Subjects Considered by the Accountants' Association This Year Were Present-Day Responsibilities, Engineering and Stores Accounting and the Budget—This Article Gives a Report of the Proceedings at Chicago

F. E. WEBSTER
Retiring President

W. G. NICHOLSON
Incoming President

THE meeting of the Accountants' Association in Chicago on Oct. 2 to 5 was especially interesting because it marked the completion of twenty-five years of activity on the part of the association.

The meeting on Monday was opened by an address by the president, F. E. Webster, who spoke briefly of the progress which has been made by both the association and the industry during the past twenty-five years and the need for a larger membership. He then explained that during the past year there had been no joint committee with the T. & T. Association on economics of schedules, as the purpose for which this committee had originally been created had been satisfied. For a similar reason there had been no joint Claims-Accountants' committee. He then referred to changes which had been made in the personnel of the committee on standard classification of accounts and on stores accounting, and stated that the association would have a representative at the meeting of the National Association of Railway & Utility Commissioners in Detroit on Nov. 14. Continuing, he said in part:

"During this convention we shall have a report, unfortunately short, because of circumstances, from a committee that has lately come into existence, but which is destined to be a very important one. It has long been my belief that we could profit by the experience of others, referring particularly to the accounting sections of the National Electric Light Association and the American Gas Association. A criticism has been made that we do not get the larger ideas of the nation, at least so far as they affect the work of an accountant, and I consider it immaterial whether he be an accountant connected with a railway or utility property or engaged with an industrial corporation. Be this criticism just or unjust it matters little, but it is a fact that all business men can profit by exchange of ideas with fellow workers—each accountant, or each accountants' association, can learn lessons from other accountants or other associations. It is realized that national accounting uniformity can only prevail along broad lines and accounting departments can better function if their practices are, as far as may be, along comparable channels.

"Many of our members are associated with utility properties, as well as railway interests, and those of us who are thus associated well realize the difficulties which arise, from time to time, through variations in classification requirements and other pursuits of our duties. With this in mind your president took the initiative of soliciting the affiliation of our accounting section with similar sections of the electric and gas associations in that full measure of up-to-date conclusions might be made available.

"It is a pleasure to convey to the members of this association the spirit of co-operation which was promptly made manifest by each of our allied associations, both of whom have indicated their acceptance of the establishment of inter-association relations. Personally, I wish to take this occasion to thank those officers who were responsible in making the relationship possible. Our meetings will be open to the representatives of the National Electric Light Association and American Gas Association and I trust those representatives will feel perfect freedom in participating in any talks or discussions that take place."

The report of the executive committee was then read. It consisted of minutes of the meetings of the executive committee during the year.

Then followed a four-minute address on safety by E. D. Reed, general superintendent Chattanooga Railway & Light Company. The report of F. J. Davis, secretary and treasurer, was then read by Mr. Davis. It showed, on Sept. 15, forty-nine individual members and an estimated number of 122 company section members. The expenses of the association during the ten months ended Aug. 31 were $1,065, mostly for printing.

The report of the committee on standard classification of accounts was then presented. It is abstracted below:

STANDARD CLASSIFICATION OF ACCOUNTS

During the past year the committee has been less active than at any time during its twenty-six years of existence. This must not be construed, however, that it has ceased to function properly or that it has in any way neglected its duties. Very few questions have been submitted to it for decision. This in a way is quite gratifying as it may be assumed that the system has proved to be well adapted to its purpose, and while the original text in the light of many years of somewhat changed operating practices might now be modified and somewhat improved upon, it, together with the several hundred cases upon which rulings have been given, generally covers the subject. It may be of interest to state that the Railway Accounting Officers' Association, which is the committee which covers steam railroad accounting, has recently been going over its text and proposes to eliminate some of its accounts. This will bring them more nearly in accord with the practice of the electric railways than they are at present.

One thing that the committee now feels should be considered is the question of providing suitable accounts to cover the operation of buses, which is a growing business and with some roads is assuming considerable importance. The committee will be much pleased if members of the association who have had experience in the operation of buses will express their views of how best to provide for this accounting.

The committee's last report called attention to the act of Congress which made it mandatory that the Interstate Commerce Commission shall prescribe in what manner and to what extent carriers must provide for depreciation and that the commission had created a department whose duties were to be devoted exclusively to the consideration of matters pertaining to depreciation and that the committee had submitted a brief on the subject at the request of Frank S. Fowler, chief of the depreciation section of the Interstate Commerce Commission. Since that time the executive committee of the American Electric Railway Association has requested that the accountants' committee follow the matter under the general guidance of the committee on national relations and we have replied that we are perfectly willing to coöperate with that committee.

During the year W. H. Forse, Jr., having given up his connection with the Indiana Union Traction Company, resigned as a member of this committee and President Webster appointed in his place M. W. Glover of the West Penn Railways. Mr. Forse had been a member of this committee since 1907 and those of us who have been associated with him in committee work feel that we and the association have met with a distinct loss in no longer having his assistance and advice. The longer we were associated with him the more we appreciated his devotion to the work, his good fellowship and his consideration for his fellow members and we wish him every success in his new undertaking. The committee again takes this opportunity to express its appreciation of the courtesies extended to it by the Interstate Commerce Commission's representatives.

The report was submitted by Henry L. Wilson, chairman; W. F. Ham, P. S. Young, M. W. Glover and Robert Wallace.

There was no discussion on this report.

President Webster then introduced as the speaker of the afternoon Walter H. Timm, secretary Public Service Commission of New Hampshire. Mr. Timm then presented the paper which is published in abstract on page 563 of the issue of this paper for Oct. 7.

At the conclusion of his address Mr. Timm received a rising vote of thanks by the members and guests present. After an informal introduction of the members and guests to each other, the meeting adjourned.

Tuesday Session

The first part of the Tuesday afternoon session was taken up with a joint meeting of the Engineering and Accountants' Associations. The report of the joint committee on engineering-accounting was presented by C. R. Harte, co-chairman. This was followed by a paper on "Related Functions of the Engineer and Accountant in Public Utility Development" read by the author, E. D. Dreyfus, engineer West Penn Railways. This joint session was covered in the Oct. 7 issue of the *Electric Railway Journal.*

At the conclusion of the discussion of Mr. Dreyfus' paper the accountants adjourned to their own room, where the first order of business was the appointment of a committee on nominations. This comprised T. P. Kilfoyle, chairman; M. R. Boylan, T. H. McRae, G. W. Kalweit and J. M. Joel.

Next the report of the committee on stores accounting was read by Secretary Davis. An abstract of this report follows:

STORES ACCOUNTING

The committee on stores accounting in its report began by going back a year or two, and calling attention to the fact that at the convention of 1921 no action was taken on certain recommendations for standard practices which it was thought should be adopted by electric railways in connection with stores accounting. These recommendations were urged for favorable action this year. They were as follows:

1. That a materials classification, recommended by the committee, be printed in pamphlet form and distributed to all member companies with recommendations that it be adopted and used as a standard practice.

2. That monthly statements, on forms set forth, be made by electric railways, reflecting the operation of the stores department.

3. That it be the practice to maintain stock books, in the form substantially as shown, in all storehouses or stock rooms where stocks of material are maintained, as the most helpful way of regulating and controlling investments in stocks of material.

4. That so-called working stocks of material, meaning thereby stocks withdrawn from the general stockroom in excess of the day's working requirements and carried in the care of some department foreman, be set up in the general stores account at inventory time and inventoried each year, thereby maintaining this asset on the books; and that stock books be carried for such materials to assist in adjusting such stocks to the consumption requirements.

This year's committee added two recommendations as follows:

5. That handling of purchase invoices, adoption of a standard form of invoice, number of copies to be made, purposes and disposition of same, certification, recording, vouchering, etc., be carried out as set forth in detail in an appendix to this report.

6. That there be adopted a system whereby containers, such as drums, reels, cement sacks, carboys, etc., can be kept track of with a view to insuring the return for proper credit and accounting for the same in a correct manner as particularly described in an appendix entitled "Accounting for Containers."

In its report, the committee also refered to discussion with the committee on purchases and stores of the Engineering Association, which went to show the need of collaboration between the two associations in this important matter.

As is suggested above, the committee appended to its report a number of concrete suggestions. They included a set of instructions covering the use of stock books, a system for handling purchase invoices, and a system for accounting for containers.

The suggested system for handling purchase invoices involves the adoption of a standard form on which the electric railway would receive its purchase invoices. After the invoice is received and checked by the purchasing agent, it would go to the accounting department. This is important because it constitutes a liability of the company. The storekeeper would also see the invoices because they familiarize him with the costs of materials. This has a good moral effect and tends to bring about economy in the care and use of materials.

In regard to accounting for containers, the committee pointed out that in purchasing material of certain kinds the shipment is made in containers which are billed against the purchaser on the invoice covering the material. These are returnable when empty and the shipper will allow the price at which they are billed, less the freight charges and cost of repairs. At present on many lines there is no particular system for keeping track of such articles, the matter being generally left in the hands of the store department but without check of any kind. The committee recommended that a special account be opened on the books designated "Container Account," storekeepers to be furnished by the accounting department with container sales order forms, made out when the invoices are received.

Storekeepers would be held responsible for the prompt return of containers when empty, or for satisfactory accounting for them otherwise, so that the container account could be relieved. Storekeepers would follow instructions on the sales order with respect to making shipments and bills for the containers shipped, the credit to the container account being shown on the bill. Other practical details of the scheme were given, but the above will serve to show the general plan.

This report was signed by R. A. Weston, chairman; C. L. Bartlett, G. H. Caskey, A. E. Hatton and J. S. Pardee.

DISCUSSION ON STORES ACCOUNTING

In discussion of the report, W. L. Davis, Allentown, Pa., said that there is one element that might be taken into consideration, namely, the desirability of devising some method of reconciling the accounting system described in the report with the general ledger accounts. Some storekeepers overlook this and make a straight division. The records show certain things and the physical count shows the same things, so that the storekeepers assume that both are correct. They do not always care to reconcile the two records, and of course they also omit adjustments in operating and construction accounts that might be involved in such reconcilement.

On motion it was decided that this feature of the subject be considered by the committee and some action taken upon it at the next meeting. The understanding is that members who have suggestions to make will make them direct to the committee.

Wednesday Session

The first item on the Wednesday afternoon session program was the presentation of the report of the committee on relations with other associations. This was made by M. W. Glover, Pittsburgh, Pa., chairman.

RELATIONS WITH OTHER ASSOCIATIONS

The appointment of this committee was the result of an informal conference in Atlantic City during the annual convention of the National Electric Light Association. A number of electric railway accountants connected with light and power companies, members of the National Electric Light Association, conceived the idea that it would be to the mutual benefit of each association to keep in closer touch with the accounting work of the other association, with a view of promoting uniformity in accounting practices relating to railway as well as light and power accounts. The matter was then taken up with the accounting section of the American Gas Association, and after the matter was considered by the executive committees of the three associations the committee was duly appointed and organized.

Owing to the fact that the plan was not finally approved until August last and as meetings of certain committees of the accounting sections of the National Electric Light Association and of the American Gas Association had to be postponed, this committee has not done any active work, but it is hoped that during the coming year it will be possible to secure greater co-ordination in the accounting work of the three associations and to promote cordial relations between them.

The report was submitted by M. W. Glover, chairman; I. A. May and L. T. Hixson.

Mr. Glover's report was followed by the reading of a paper on "The Budget —Its Preparation and Administration," by Harry A. Snow, assistant comptroller the Detroit Edison Company. This paper had been presented at the Atlantic City convention of the N.E.L.A. last spring, where it made such a good impression that President F. E. Webster invited Mr. Snow to repeat it before the Accountants' Association. In introducing the speaker, Mr. Webster said that he had been operating under the budget system for two years and has found it of inestimable value. In his judgment the time will soon come when companies not now operating under the budget plan will find it of distinct value to do so.

Mr. Snow's paper was abstracted in outline in the Oct. 7 issue of the *Electric Railway Journal.* He prefaced the reading by a statement that the paper was the result of the work of the budget committee of the N.E.L.A. accounting section, of which he was chairman. The work had been divided among sub-committees, all of which contributed their shares to the production of the paper. Further, it was written primarily for electric central stations, but should apply also to electric railways because the two utilities are not essentially different.

In opening the discussion on Mr. Snow's paper, Mr. Webster said that following the reading of the paper at Atlantic City it was found that many matters had been brought to light which were new. Questions were asked by those who had operated under the budget plan, to ascertain what Mr. Snow would recommend to overcome certain difficulties or what initiative he would suggest be adopted to safeguard the future.

Mr. Glover pointed out that the subject of budgeting, particularly with reference to construction expenditures, has received more attention during the last few years than ever before. Even the federal government has taken up the idea. The West Penn Railways uses the construction budget and the operation, or operating cash budget, as explained by Mr. Snow. This company has not gone into the details of the materials and supplies budget, nor has it separated the operating from the cash budget. This will probably have to be done. The management of this company would find it almost impossible to provide funds in advance as needed, without an elaborate budget system.

There should be no fear, said Mr. Glover, that the plan outlined by Mr. Snow is too elaborate. While this system is designed for a large company, it can be used by the smallest one that requires money to carry on its business. Mr. Snow's paper was not a theoretical discussion of something that may take place in some company, continued Mr. Glover, but it was the recital of actual facts.

Another speaker said that the practice of the company with which he is connected is to hold department heads responsible for their particular activities. Each writes a monthly letter in which he sets forth the reasons for the variations between actual expenses and budget estimates. The statistical department reports to the general manager, and to the budget bureau also.

W. G. Nicholson, Omaha, Neb., said that he could not see how any company could proceed with construction work, or any other work, without forecasting revenues and expenditures for the period ahead. In Omaha the department heads report contemplated projects to the general manager before the first of the year. He passes upon them and presents them to the board of directors, with his estimate of the cost of carrying out these projects throughout the year. The accounting department at the same time gives the board of directors an estimate of the earnings and expenses, for the year and the probable amount of cash necessary and available.

Mr. Snow was then called upon to answer the questions which had been asked during the session. As to one on the reconciliation of cash receipts with the statements of earning and expenses, he said that the statement is put on a cash basis first. That is, on accrued items, such as taxes and interest, the statement is turned over to the cash basis. There are the two bases for comparison, one the cash basis in which the checking is done with the cashier, and the other the bookkeeping basis on which the checking is done with the accountant. As to the amount of detail used in the analysis of expenses to check on the operating budget, the budget is made up in the subdivisions supplied by the classification of operating accounts. Thus, the books themselves will be in the proper shape to check the estimates because the latter were made to fit the books in the first place. If two men use the same subaccount, involving two sections of the estimate in one account, it might be desirable to divide that account into two, to facilitate checking.

Taking up several special questions, such as how often the budget should be revised, what should be done if a favorable market were suddenly found permitting a large stock of material to be bought at a favorable price, and the over-sale of stock in a campaign in which the company found itself supplied with a large amount of money which it did not expect, Mr. Snow said that all of these matters can be taken care of by the fact that the budget is not an unalterable law. Budgets must be revised to meet new conditions.

The discussion of Mr. Snow's paper closed with a motion that the paper be published in a separate pamphlet so that the members can have copies as promptly as possible. The meeting then adjourned with a vote of thanks to Mr. Snow for his paper.

Thursday Session

The first business at the closing session of the convention, on Thursday, was the presentation of the report of the committee to represent the Accountants' Association at the annual convention of the National Association of Railway and Utility Commissioners. This was done by W. L. Davis.

The committee reported that copies of the report of the chairman, dated Oct. 17, 1921, had been distributed by the secretary some time ago. This report outlined in a general way the subjects discussed during the commissioners' convention. If the work of the committee is continued, it will be possible not only to keep the Accountants' Association advised of the proceedings of the commissioners' convention but will also afford opportunities to anticipate accounting requirements and to devise ways and means to avoid some of the difficulties incident to analysis of records pertaining to prior years. Among the topics considered by the Atlanta convention of the commissioners, the following are of special interest: Special rates and special compensation for temporary or "risk" service furnished by electric railways; lower fares for regular riders; general use of one-man cars; possible recommendations for a standard classification of accounts; various elements entering into valuation, particularly in connection with arbitrary items.

PAST-PRESIDENTS HONORED

After the discussion of the above report, President Webster turned the meeting over to W. F. Ham, Washington, D. C., who was first presented with a past-president's badge.

Mr. Ham reviewed briefly the history of the association, beginning with the Cleveland meeting of 1897. At this meeting there were about eighteen present, of whom Mr. Ham was one. At that time there was no standard accounting system, although attempts had been made to formulate one. A committee on standard classification was appointed, with Mr. Ham a member. He has been on this committee continuously ever since. The classification was in due time prepared and it has stood substantially in the original form ever since.

During the twenty-five years of its history, said Mr. Ham, the association has done a great deal to dignify the position of the accounting officer and increase the value of the work of the accounting department.

Mr. Ham then took up the list of past-presidents, the oldest of whom in point of service, and still living, is H. L. Wilson, treasurer Boston Elevated Railway. A communication from Mr. Wilson was read.

George B. Willcutt, San Francisco, Calif., who read Mr. Wilson's letter, referred to accounting in the early days in California, where the system of accounting was a mongrel affair. Questions involving relations with the city necessitated a more permanent system of accounts. Mr. Willcutt worked up a system based on the steam railway subdivisions, as called for by the Railroad Commission, which the steam railroads then adopted.

Next a telegram from H. C. Mackay, Milwaukee, was read. This stated that a merger of several public utility properties with which Mr. Mackay was connected prevented his attendance. It was brought out that Mr. Mackay, as well as Past-President C. N. Duffy, who was not present to receive his badge, were members of the classification committee of the early days.

A letter from F. E. Smith, Fort Myers, Fla., and telegrams from W. B. Brockway, Portland, Maine, and C. L. S. Tingley, Philadelphia, Pa., were also read.

Mr. Ham next presented the badge to P. S. Young, Newark, N. J., who in response predicted a much greater field of usefulness for the accountants than ever. The accountant has, he said, been expert in the mechanics of the business and he has been depended upon in that branch of his profession. Today he is depended upon for much more than the mere mechanics of the profession. His advice has come to be sought by the management upon economic questions and upon the financial questions that arise in the business, as well as on many questions of operation. This has come about naturally and without undue forcing of opinions on the men who have been responsible for the operation of large properties throughout the country.

The era of regulation, said Mr. Young, has brought about many problems never thought of in the early days. The accountants in the industry should take part in the solution of these economic and financial problems which must be met. The accountant should bring before his management the necessity for adequate results, preparation, sound financing and good public relations. Accountants should urge the distribution of securities among their customers. This will improve relations between the public and the electric railways.

Mr. Young closed by recommending that the paper by Mr. Dreyfus, presented before the joint session with the engineers on Tuesday, should be presented before joint conferences of accounting men and engineers in each company, for, he said, there is a great deal to be done in linking up the accountants with the other departments. The more they know of each other, the better and more useful they will be to each other.

Mr. Ham emphasized what Mr. Young said. He also impressed on the association the need for depreciation charges. In the early days of the business, he said, there was no accounting for depreciation nor any provision for it, because it was a subject that was not well understood. One of the greatest activities of this association will probably be to work out proper systems of accounts for depreciation. The Accountants' Association, in conjunction with the public relations committee of the parent association, is working with the Interstate Commerce Commission in the endeavor to establish proper rules for depreciation.

A badge was next presented to M. W. Glover, Pittsburgh, who referred to the early meetings, particularly the 1897 meeting held at the Hollenden Hotel, Cleveland, at which H. H. Windsor, Chicago, Ill., presided, and M. W. Hall Camden, N. J., was elected permanent chairman. At this meeting Mr. Wilson was elected president. The first meeting after organization was held at Niagara Falls in October, 1897. In 1906 the name of the association was changed from "Street Railway Accountants' Association of America" to "American Street and Interurban Railway Accountants' Association." Mr. Glover deplored the apparent lack of interest in the work of the association as evidenced in the small attendance at the meetings, and Mr. Ham also felt that there is not the life and influence in the work that there was in the earlier years. Of course, he said, everything was new then and it was possible to get up a couple of hours' discussion on some practice which was now uniform.

T. P. Kilfoyle was the next past-president to be honored with the presentation of a badge. He responded briefly, emphasizing the fact that those who are active in the association get a great deal more out of it than they put in.

Mr. Ham then presented a badge to Retiring-President Webster, who in responding reviewed the work of the year and called upon Walter Shroyer for the report of the committee on resolutions. Next, on motion of the nominating committee, the following were elected for the ensuing year: President, W. G. Nicholson, secretary and auditor Omaha & Council Bluffs Street Railway, Omaha, Neb.; first vice-president, E. M. White, Binghamton, N. Y.; second vice-president, L. T. Hixson, Indianapolis, Ind.; third vice-president, Wallace L. Davis, Allentown, Pa.; secretary and treasurer, James W. Welsh, New York, N. Y.; executive committee, J. J. Duck, Chicago, Ill.; F. J. Davis, Newark, N. J.; Walter Shroyer, Anderson, Ind.; L. E. Lippitt, Auburn, N. Y. After brief remarks by those of the incoming officers who were present, the convention adjourned.

Conference on Electric Railway Track in Paved Streets

PAVEMENT construction for streets containing street railways and the character and the amount of pavement deterioration due to effects of street-car traffic were considered at a conference of street railway and paving engineers held at the Philadelphia Engineers' Club on Oct. 9. Location of utilities in streets; design of street railway track structure; paving and drainage of streets for street-railway traffic; and the extent to which pavement is affected by street railway traffic, were the nominal subjects for discussion. As a matter of fact remarks often wandered afield into pavement design in general and the effect of heavy truck traffic on pavement.

Theoretically the perfect locations in the streets are as follows: Street railways in the center and all other utilities at the sides or under the sidewalks. It was agreed that wherever possible this plan should be followed in new construction. In extensions of streets into outlying territories being developed, many cities are now locating all sub-surface utilities at the sides, leaving the center clear of structures other than the railway track. This clean-cut separation is less practicable in built-up sections and particularly in the older heavily built-up business sections of the larger cities, but even here consistent effort can do much. In Philadelphia, even in the older and narrower streets, many of the utilities other than street railways are, as they are rebuilt, being located at the street sides; on occasions space has been condemned to accomplish this relocation.

Opinion on track design ranged from the advocacy of perfectly rigid construction on a massive concrete base to flexible construction on ties and ballast. The street railway engineers were reluctant to concede that the track or car traffic had any considerable deteriorating effect on the pavement and the city paving engineers contended that they were prime causes of pavement destruction. Many examples of pavement failure attributed to the action of street railway track were cited and shown by pictures. Failures developed first at joints, and more particularly at crossings which were approximately at right angles. From these points they progressively spread. As explained by the city paving engineers, the vibration of the rails at joints and crossings is the cause.

While assenting to the claim that poor track construction contributed to pavement failures the street railway engineers pointed out that many of the poor details of such practice had been or were being corrected and there was considerable promise that the future would show decidedly improved results. They insisted, however, that correspondingly better paving structure was needed. With modern truck loads, there should be thicker pavement, better foundations, and far better drainage. Indeed it was the general attitude of the conference that paving practice generally had to be advanced to meet the present traffic loads and speeds.

Notes on French Car Design

Paper by Prominent French Railway Engineer Before French Railway and Automobile Association Outlines Standards and Analyzes Conditions for Satisfactory Service as Far as Design Is Concerned

THE interest of equipment men in standardization of electric railway cars, as evidenced by the report of the Engineering Association committee on unification of car design and the discussion on the report at the Chicago convention, makes timely a reference to the paper by M. Castaing, read at the 1921 convention of the Union des Voies ferrées d'intérêt local et des Transports publics Automobiles de France. The author is chief engineer of traction of the unified transportation system in Paris.

M. Castaing states that the committee on standardization of rolling stock of the French association recommended five types of motor cars and four types of trail cars, all possessing the following characteristics:

1. Necessity of more than one entrance step is obviated, and

2. Large entrance openings are provided to facilitate interchange of passengers. These are closed by double sliding doors. (On the Paris system the opening width is more than 5 ft.)

The dimensions of these cars are given in Table I. Types A to E are motor cars, F to I trailers.

Bodies of the type D Paris cars are constructed entirely of wood, which the author considers preferable to steel construction because of the greater ease in making repairs. He states that in Paris, for example, there is an average per week of more than ten collisions for each 100 cars in service, but it is possible to keep from 82 to 84 per cent of the motor cars and more than 90 per cent of the trail cars in good condition and ready for operation at all times. The weight of the standard D car as compared with the safety car built by the Osgood Bradley Car Company of Worcester, Mass., as described in the *Electric Railway Journal* for May 15, 1920, is given by the author in Table II.

The Paris company has been making experiments to determine possibilities in the way of weight reduction and has built an experimental car which it is thought will reduce the weight 25 per cent as compared with other cars owned by the company of the same capacity, and at the same time reduce the dead weight on the axles. One way by which it is accomplished is by the abandonment of the truck. The car has four wheels and two axles, each axle being driven by a separate motor whose armature shaft is parallel with the side of the car and drives the axle by double gear. The motors are attached to the car frame, as are the journal box springs. The main dimensions follow:

TABLE II—COMPARISON OF CAR WEIGHTS
(All weights in pounds)

Weight	Paris D Type	Safety Car
Car and equipment	31,450	17,500
Electrical equipment	6,400	2,150
Underground plow	880	......
Car without equipment	24,200	15,500
Seats	49	32
Weight per seat	495	485

Wheelbase	11 ft. 10 in.
Length over all	35 ft.
Width	6 ft. 7 in.
Number of passengers	49

On the subject of suspension the author points out that the functions of this are to assure by its flexibility the comfort of the passengers and the preservation of the body, truck and equipment, against the dynamic shocks from the track. Most of these effects, which depend upon the state of the track and the speed of the car, must be absorbed by the spring system. At the same time there must be sufficient stability to prevent oscillations due to inequalities in the track.

The contradictory requirements must be harmonized, on the one hand by the judicious choice of the total deflection which the car may make and particularly the selection of proper flexibility of the springs; and on the other hand by the proper choice of the type of suspension, of such dimensions of the car as wheelbase, total length and position of the center of gravity, and by determining carefully the points of application of the several springs.

The choice of the ratio of the dead suspended weight to the useful load has a direct influence on the flexibility and stability of the empty vehicle. In one car with a rigid wheelbase which was carefully studied this ratio was between 3½ and 4. For motor cars with two trucks this can be as low as 3 or 3½. For trailers the ratio is necessarily lower, on account of the relative lightness.

It is desirable to secure the maximum value for the ratio of the dead suspended weight to the dead total weight. In one motor car carefully studied this was about 85 per cent. For trailers this value can easily be exceeded. This ratio is affected by the weight of the assembled wheels, axles and springs, to which there must be added for motor cars the weight of one motor, because as a first approximation it may be assumed that one-half of the weight of each motor is suspended, the other being supported by the axle.

Further for stability the maximum value of ratio of length of body to wheelbase is about 3, being limited by the risk of creating a teetering motion which can only be prevented by diminishing the total deflection and therefore the "suppleness."

The choice of the total deflection under load of a tramway car is very important, since on its value depends in great part the flexible quality of the suspension. It is variable with the type of suspension employed, according to whether the suspension is one comprising entirely helical springs or elliptic springs or a combination of these. A suspension consisting entirely of helical springs gives a total deflection necessarily smaller than all other types, on account of the necessity of limiting the oscillations inherent in this type of suspension. For one vehicle carefully studied, of which the useful loads varied between 3 and 4 tons, the total deflection under load may be of the order of 2.4 in. for a suspension entirely made up of helical springs, and 4 in. for a mixed suspension or one with elliptic springs.

TABLE I—MAIN DIMENSIONS OF STANDARD FRENCH CARS

Types of Car	A	B	C	D	E	F	G	H	I
Length over bumpers	31 ft. 3 in.	31 ft. 11 in.	37 ft. 1 in.	37 ft. 1 in.	41 ft. 5 in.	27 ft. 8 in.	28 ft. 6 in.	28 ft. 11 in.	40 ft. 4 in.
Width	6 ft. 7 in.	6 ft. 7 in.	6 ft. 7 in.	6 ft. 7 in.	6 ft. 7 in.	6 ft. 7 in.	6 ft. 7 in.	6 ft. 7 in.	6 ft. 7 in.
Height	10 ft. 2 in.	10 ft. 2 in.	10 ft. 2 in.	10 ft. 2 in.	9 ft. 10 in.	10 ft. 2 in.	9 ft. 6 in.	9 ft. 10 in.	9 ft. 10 in.
Wheelbase of single truck	9 ft. 10 in.	11 ft. 10 in.	11 ft. 10 in.	11 ft. 10 in.	....	9 ft. 10 in.	9 ft. 10 in.	9 ft. 10 in.	....
Distance between truck centers	....	....	....	....	23 ft. 9 in.	....	....	....	23 ft. 9 in.
Wheelbase of double truck	....	....	....	....	3 ft. 11 in.	....	....	....	3 ft. 11 in.
Number of seats	36 or 40	44	49	49 or 50	54	36 or 37	46	48	57
Number of motors	1 or 2	2	2	2	4	..	..	..	..
Capacity of each motor	variable	60 hp.	60 hp.	60 hp.	60 hp.	......	......	......	......
Total weight empty, tons	10.5	13.8	15.8	15.8	20.5	6.4	6.8	4.4	8.9

Public Utility Securities*

Conditions Improving, but More Detailed Reports Are Urged—Comments on Legislation and Other Conditions

By John A. Prescott
Chairman of Committee of Public Service Securities, Investment Bankers' Association of America

During the last two years there has been marked improvement in the demand for public utility securities, which, coupled with declining interest rates, has resulted in a broader market and higher prices. This has affected not only senior issues, like funded obligations, but also junior issues even to some of the more speculative classes. Mortgage bonds, and even preferred stocks, of the best established companies can now be sold with comparative facility, although in case of preferred stocks still at relatively high cost. With very few exceptions, however, common stocks are difficult, if not impossible, to market. Thus, the financial problem is still the overshadowing one.

As we indicated in our May report†, we believe a much larger proportion of capital than has been the practice in recent years should, to accord with sound principles, be hereafter supplied by junior financing. It is very generally understood that if mortgage bonds are to be readily sold they must be protected not only by a sufficient equity or margin of security, but also by a satisfactory margin of divisible income. It is not so well understood, by the public at least, that if a preferred stock is to be readily sold it also must have behind it a margin of security and of income adequate to give it a high degree of safety and reasonable assurance of continuity of dividends.

Capital for the final equity or common stock should be obtained primarily from the people of the community which is to enjoy the service, but if conditions should be such that it cannot be obtained from them, it must be sought in other money markets. Investors in such markets can receive no direct benefit from the development of the utility service itself and must, therefore, be attracted by safeguards to their investment and yields such as will seem attractive to their eyes, as compared to other similar investment opportunities.

Protection of the security and income of the capital invested in the final equities, or common stocks, of public utilities evidently must be, as it should be, the fundamental factor in the development of public utility service. Where such conditions have existed and companies have, therefore, been able to build up sound financial structures, investment bankers have felt safe in supplying common stock capital. As such protection and conditions become more widespread new sources of such capital will be found and drawn upon by investment bankers and customer ownership will become increasingly common.

An increased confidence of investors in public utility securities will accrue from the dissemination of more complete and comprehensive information concerning the economies of the public utility business. A careful study of annual reports, circulars and statistical manuals discloses a marked improvement in recent years in this direction. We believe that co-operative effort on the part of the industry, investment bankers, and publishers of statistical and rating manuals will bring about still further inprovement. Much additional data are really available because many states require the filing of complete operating and statistical reports. These data require only to be made more accessible. Perhaps the greatest need for more complete information is with regard to so-called holding companies. These are often very large and their relations with their operating companies are sometimes very complex. Full information necessary to a complete disclosure of their financial condition often would be very detailed and voluminous, but the fact that such information is furnished by some of them indicates, in the opinion of your committee, that there are no serious obstacles to its disclosure by all. We believe that any such company which seeks capital from the investing public should make available and readily accessible all information and data pertaining to both the holding company and subsidiaries necessary for a thorough study of earnings, expenses, maintenance expenditures or reserves, fixed charges, dividends, assets, capitalization and liabilities. Without these an appraisal of the real worth of its securities would not be possible.

Missouri Constitutional Convention

The constitutional convention in session for some time past in Missouri is attempting to draft a new constitution for submission to the voters of that state. Among the proposed provisions of interest to investment bankers are those for taxation and the authorization and limitation of municipal indebtedness.

The provision for taxation includes the classification of property with a view to a more equitable distribution of the burdens of taxation.

Some of the provisions for the authorization and limitation of municipal indebtedness are to the following effect:

1. The pledge of the general credit of a municipality for general purposes is limited to 5 per cent of the assessed valuation.

2. The general faith and credit of the municipality may be pledged for 5 per cent additional for the purpose of constructing or acquiring public utilities, commonly supposed to be self-sustaining.

3. Additional indebtedness may also be incurred, without, however, the pledge of the faith and credit of the municipality, for the purpose of financing publicly owned utilities, the security being in such case the utility property constructed or acquired and the revenue which may be derived therefrom.

Some of these provisions suggest interesting questions concerning municipal credit. In the cities of some other states, perhaps because of the tax-exempt features of municipal bonds and the consequent ready market for them since tax burdens have become so heavy, there has appeared a rather alarming tendency, encouraged probably in some cases by political exigencies to pile up municipal indebtedness for many purposes, including raising funds to acquire or extend utilities which seemingly might be carried on as well or even more economically by private enterprise. It is a serious question how far such tendencies may be indulged without seriously affecting municipal credit as a whole. Capital absorbed for such purposes ceases to be a subject for taxation and increases in proportion the tax burdens of other property or reduces public revenue. The withdrawal of so much capital from productive industry serves also to menace industry and make industrial financing more expensive. It is not sufficiently appreciated how intimately and adversely such conditions affect the welfare of every individual citizen regardless of his vocation or station in life.

Whatever the correct conclusions as to these questions may be, these tendencies suggest extreme caution on the part of investment bankers in considering securities issued for such purposes. Should not the investment banker be as particular to examine into the feasibility and self-sustaining capacity and the character of administration of such publicly owned enterprises as he would be if he were considering the securities of a privately owned corporate enterprise?

There have been cases where administrations have operated utilities, such as waterworks, for years without publishing operating statements. When such operations finally have been investigated they have been found frequently not to be self-sustaining. Such disclosures have brought surprise and shock to the tax-paying public, and sometimes impaired municipal credit. We believe that taxpayers and investment bankers both should insist that municipalities at least adopt thorough accounting and sound financial methods if they are to own and operate public utilities, so that the public served and investors both may be able to ascertain the results of such operations and to judge whether they are economically managed.

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*Abstract of a portion of a report relating to electric railway securities, presented at the annual meeting of the Investment Bankers' Association of America, Del Monte, Cal., Oct. 10, 1922.

†See abstract in *Electric Railway Journal*, June 10, 1922.

Public utility bonds are already legal investments for savings and trust funds in twelve states. For some time it has been felt generally that savings banks in other states should logically be extended the privilege of purchasing gilt-edge utility bonds which are generally conceded to constitute one of the safest classes of investment securities and which yield on an average a somewhat higher rate of return than legal rails. A joint committee of the National Conference of Mutual Savings Banks and the National Electric Light Association was appointed last December to consider this question. A member of our committee is serving on that joint committee. The joint committee has held a number of meetings and at the convention last spring of the National Conference of Mutual Savings Banks a session was devoted to discussion of this subject. It is hoped that substantial progress will be made during the coming winter.

IN GENERAL AND IN CONCLUSION

It would be strange indeed if the public utility industry, unlike all other forms of business enterprise, should have emerged from the upheavals of the great war with no changes in the conditions of its existence, no new problems to confront it. Like others it was obliged to meet higher operating costs and heavier taxes with reduced income. The large increase in the number of private automobiles in operation and jitney and auto-bus competition have made inroads into the patronage which the electric roads would otherwise have enjoyed, and the construction of parallel hard surfaced roads will probably further, and sometimes wastefully, multiply transportation facilities and divide the available business. New capital, or capital to meet maturing bond issues, has been and is still unduly costly to all public utility companies, because their securities must compete in the money markets with an enormous volume of tax-free municipal bonds. It has been authoritatively stated that more than one billion dollars of such tax-exempt securities were issued in 1921.

On the other hand, these adverse and discouraging conditions seem likely to be overcome by favorable and encouraging ones. Costs have declined considerably and gradually improving general business conditions are bringing some increases in earnings. The practical experiences and lessons of the war and its aftermath seem to have done much to clear the atmosphere and bring about a more widespread popular understanding of the value and necessity of the services supplied by the public utility companies, the advantages of private ownership and operation under sane public regulation, and the economic and financial conditions under which efficient and satisfactory service, keeping pace with public demand, alone is possible. The present practice of many utility managements of frankly discussing the problems of the industry with its patrons is stimulating public confidence and good will. There is a growing recognition of the real mutuality of interest between the companies and their patrons. To paraphrase a recent statement of the president of one of our most successful railroad companies:

1. The customer's attitude toward a public utility can now be guided and made informed and friendly.

2. Satisfied customers now can be used to build up good will.

3. Pleased customers will voluntarily help a utility to get new business.

This better mutual understanding already has enabled the managements to eliminate much useless expense and many artificial obstructions to efficient operation, and has removed much of the uninformed popular objection to adequate rates. It certainly will bring many other practical and profitable advantages, including improved credit. Investment bankers will naturally give great weight to such favorable conditions in considering public utility financing.

As has been stated in previous reports, this committee has faith in the fundamental soundness of the public utility business, including gas and transportation as well as power and light. There is an insistent and, we believe, permanent demand for the services it renders. We expect that public utility credit will be soon established upon a basis of greater permanency and stability than ever before. As in other industries, there will be exceptional situations; and discrimination and sound judgment will be required. But the solution of the impending financial problems of the public utility companies will, in our opinion, afford investment bankers opportunities for both constructive public service and profit, and will demand the assumption of duties and responsibilities from which they should not shrink.

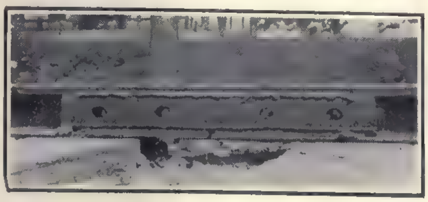
Rehabilitation of Electric Railway Tracks*

An Account of How the Eastern Massachusetts Street Railway Has Improved Its Tracks, with Special Reference to Drainage—This Company Operates 700 Miles of Track, One-Half Each in City and Country

BY FRANK B. WALKER
Chief Engineer of Maintenance of Way,
Eastern Massachusetts Street Railway, Boston, Mass.

THE tracks of the old Bay State System prior to its reorganization June 1, 1919, had not been adequately maintained and, when the public trustees took charge of the property on that date, an elaborate program of rehabilitation became necessary. This system covers the eastern section of Massachusetts from the Merrimac Valley on the north to Fall River on the south, but with very little mileage in Boston proper. We operate about 700 miles, of which half comprises country lines and the other half paved city lines.

The country lines are constructed for most part alongside town roads and state highways. When rehabilitation work was started, the tracks were low and badly drained, the ties were in poor condition, the rails were out of line, surface and gage, and the joints were low battered and pounding.



WELDED AND GROUND JOINT IN 60-LB. RELAYED TEE-RAIL IN HAVERHILL

During the three years 200 miles have been overhauled and reconstructed, which, together with about 50 miles previously in good condition, gives us now about 250 miles of good country track and leaves less than 100 miles for 1923, when we plan to complete our program.

The city track was in better condition than that in the country, but considerable work was necessary on that also. We have entirely reconstructed 40 miles and made substantial repairs of much more, in addition to completely renewing 700 pieces of special trackwork, such as curves, frogs, switches and mates.

NEW TYPE OF RAIL BENDER DEVELOPED BY EASTERN MASSACHUSETTS STREET RAILWAY FOR USE IN REHABILITATING GIRDER AND TEE-RAIL TRACK

On both classes of track we have installed nearly 400,000 ties, ground the surface of 75,000 joints and the corrugation from the top of about 120,000 lin.ft. of girder rail in paved streets.

In the rehabilitation work special attention was given to drainage. Tracks were raised out of the mud, 6 to 18 in. of good gravel ballast was put in, the backfill was cleaned off above the tie by making full open section where possible or half open in other places, and deep side ditches and offtake ditches were dug. In this work we were assisted materially by co-operation with city, town and state highway engineers. The drainage of city tracks was accom-

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*Abstract of paper read before Boston Society of Civil Engineers, Sept. 20, 1922.

STRETCH OF TRACK ON THE LOWELL-READING LINE, SHOWING METHOD OF DRAINAGE

SAMPLE OF TYPE OF TRACK NOW BEING LAID BY THE EASTERN MASSACHUSETTS STREET RAILWAY

plished largely by raising the tracks and installing additional track catch basins.

Special attention was given to ties. On country lines we use a chestnut tie untreated, and paved tracks are retied with yellow pine treated with 10 lb. of creosote oil.

Country tracks are ballasted with at least 6 in. of good clean gravel and city tracks with at least 6 in. of broken stone. The subgrade is rolled and the stone ballast rolled before the track is laid. The best country lines are laid with 75-lb. A.S.C.E. rail, with welded joints, and paved tracks with 7-in. tee 91-lb. or 9-in. girder 104-lb. rail. The 7-in. tee is the standard and is used wherever the depth of paving will permit. Tie plates are used on all paved tracks.

All tracks, city and country, overhauled or rebuilt have all joints welded and ground. For the past two seasons we have used the metallic electrode arc method of welding and so far there has not been a failure. While plates and rails have broken, the breaks do not total 2 per cent of the total joints welded and are probably due to temperature stresses or defective rails or plates. Expansion joints are put in 750 ft. apart on open tracks.

In repairing a joint on old rail, we first renew the ties, then clean the plates of scale and rust and replace them with bolts or clamps, then bend the rail slightly above the proper surface with a sturdy rail bender of our own design, retamp the ties, weld on the plates, surface weld the cup if there is one, and then grind the surface with a rotary or reciprocating grinder.

New rail is welded in the same way except that no vertical bender or surface welding is needed. We do very little bonding at rail joints, as the welding serves to carry the negative current satisfactorily.

Our seam welders are of the dynamotor or motor generator type, using 20 volts and about 150 amp. Our surface welders are of the resistance type. Of grinding machines we use two general types, rotary and reciprocating. Of the rotary machines, with 14-in. emery wheel and 5-hp. motor, we use about thirty. Of the reciprocating type with four carborundum bricks moved back and forth over the rail by a 5-hp. motor, we have ten, and they are used for grinding corrugation from the heads of rails and on surfaces of joints of new rails. The rotary machine will grind fifteen to thirty joints per day, and the reciprocating machines 200 to 400 ft. of corrugated rail.

In general, I would say that better work must be done on street railway tracks than ever before. This means close attention to details and building up of proper morale of the men. The men must also be trained in the best way of doing work. Last December, January and February we conducted a winter track school, in which we attempted to train 125 of our engineers, roadmasters and foremen. Illustrated lectures each morning were followed in the afternoon by shop work. The results amply repaid our efforts.

On our property we are already noticing considerably decreased maintenance costs in the track due to the fact that more light-weight cars are being operated. We are also experiencing a decidedly decreased maintenance cost in the rolling stock department, amounting to at least $100 per car per year, due to the work of rehabilitation.

Modern Improvements in Rolling Stock*

The Author Contrasts Electric Railway Car Practice in Great Britain and America, and Suggests that Radical Means May Be Required to Overcome Defects—At the Same Time the Tramway Is Far from Obsolete

BY C. J. SPENCER
General Manager London Group of Tramway Companies

IN A PAPER presented before a recent congress of the Tramways and Light Railways Association (England) the writer drew attention to the fact that while in America on a visit in 1919 he had noted very great changes in the design of rolling stock as compared with an earlier visit in 1903, yet in England little or no change had taken place, the type of car and its equipment being almost identical with that in use twenty years ago.

Probably the reason for this is to be found in American method and psychology, as compared with British methods and practice. The American tramways engineer is adaptable to changing circumstances and is generally a great believer in scrapping rolling stock for new types whenever possible, in contrast to the more conservative policy of the European.

Which of these is the better policy it is difficult to say. As in most things moderation is desirable. I should be the last to contend that the English type of car is the best and that it is not open to considerable improvement.

The last ten years have seen a remarkable development of the rubber-tired road-borne type of vehicle, as contrasted with the rail-borne variety. Some enthusiasts have gone so far as to say that for street transport work there is no need for a rail and that the transport of passengers can be more efficiently undertaken with a rubber-tired vehicle, whether gasoline driven, or of the railless trolley type.

I think, however, that among experienced transport men it is conceded that there is a proper field for both types; that they are not necessarily competitive and, in fact, may be complementary.

The tramcar is not, however, quite as popular as it deserves to be. The development of the newer vehicle has impressed the public and the stationary period of evolution in tramcar design has seriously damaged its reputation. The public draw comparisons unfavorable to the tramcar for reasons which, in the view of the writer, need not exist. It is said, for example, that a tramcar is a noisy and from a modern point of view, a slow, cumbersome and inconvenient vehicle.

A steel wheel running on a steel rail must inevitably create more noise than a rubber-tired wheel on an ordinary road surface, but I am not sure that we need have as much noise from this source as we have today if full consideration was given to the merits of a wooden foundation as contrasted with a concrete foundation, with a paving substance of wood or otherwise, with the object of deadening wheel and rail noises.

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*Abstract of paper read at convention of Union International de Tramways, de Chemins de fer d'Intérêt local et de Transports Publics Automobiles, Brussels, Oct. 2-6, 1922.

In England all tramways have been constructed under a general act of Parliament, 1870, which imposes upon the Tramway Authority the duty of keeping an almost perfect road level, and this has inevitably led to the construction of a rigid concrete foundation and consequently a hard, non-flexible and noisy track.

From observations in the United States I can say that any attempt to achieve the impossible, i.e., introduce a light railway on the highway without impairing the surface, is not undertaken there.

The introduction of some non-conductor of sound and vibration between the tire and the wheel center or between the wheel center and the axle would greatly improve matters. If by some means it were possible to isolate the short vibrations (noise) inseparable from the running of a steel wheel on a grit-covered steel rail, noise would be largely eliminated and the premature destruction of many parts of the equipment by short wave vibrations would be obviated. On the first electric cars run in England (on the Blackpool Electric Tramways, opened in 1885) the motors were attached to the car body, the drive to the axle being by means of a double-reduction spur gear and an endless chain. While this design was by no means ideal, the cars certainly ran much quieter, apart from the spur gear, than most cars do today; in fact, with a well-meshed spur mounted on the body the car was nearly noiseless.

REDUCING WEIGHT OFFERS POSSIBILITIES

Full attention has not been given to the possibility of reducing unsprung weight. For example, the wheels, axles, axle-boxes and half the weight of the motors represent a dead weight of 4,700 lb. on an ordinary four-wheel, fifty-passenger car, and this unsprung weight is hammering on a rigid base in some cases at a speed of 20 m.p.h. or more. It is not surprising that considerable damage is done to joints, points and crossings.

Tramway operators might well ascertain whether the major portion of this unsprung weight could not be converted to sprung weight. Automobile engineers have managed to reduce unsprung weight to a relatively small amount.

Furthermore, by the employment of some of the modern high tensile steels, or other metals, much of the present weight of axle and wheel necessary to withstand the strain could no doubt be eliminated and thus facilitate the production of a really scientifically designed wheel and axle.

It is difficult to understand why it should be necessary to carry more than half the dead weight of the motor, with its accompanying heavy gears, on the car axle, and why the motor cannot be carried as sprung weight driving the car axle by some other means than a spur gear with the consequent elimination of the noise inseparable from such heavy gears.

This also opens up the possibility of higher-speed motors (in consequence of higher gear ratios) which would mean lighter and cheaper machines. Some progress has certainly been made during recent years in the direction of lighter motors, but we are not yet near the limit of possibilities. A well-known firm of motor-omnibus builders is today employing an electric motor on its vehicles of a total weight not exceeding 25 lb. per horsepower output, whereas the lightest tramway motor I know of weighs about 70 lb. per horsepower.

Designs of a motor as low as 20 lb. per horsepower output have recently been considered by my companies.

GETTING HIGHER SCHEDULE SPEED

There is, of course, a limit to maximum speed in the public highway beyond which it is not safe, but that maximum in its turn is governed by the time taken to bring the car to a standstill without unduly straining the equipment, or the passengers, in the process. The whole question turns on the employment of power brakes as contrasted with the present very unmechanical hand brake, first used I believe on Roman chariots. A braking rate of 4 to 6 ft. per second per second is a practicable proposition, and a rate at which cars could be brought to a standstill in a very short distance without inconvenience to passengers. This, together with better acceleration, would give an improved return to the undertakings, better service to the public and lower working costs on account of the higher average speed.

The present acceleration of a tramcar is admittedly not inseparable from jerks. A steady high rate acceleration is very desirable, providing it is steady, but the present method of series-parallel control does not lend itself to this desirable feature. I would suggest that the subject of shunt motors, with an even acceleration capable of running at any economical speed up to the maximum, is worthy of consideration, with the possibilties of regeneration of current.

Regenerative control was, in my view, just a little ahead of time. I had some very interesting results from experiments with Mr. Raworth's system some years ago. From the operation side the system was successful and practical in every way. The net current consumption of the cars fitted with this control was from 25 to 30 per cent less than the ordinary equipments, but the motors could not withstand the continuous work, and became overheated. Since then, however, motor design has improved, and what was impossible in, say 1908, may, with ventilated and inter-pole motors, be quite feasible to-day.

Allied to this subject of speed control is a recent development of considerable value, viz., the use of contactors in the place of direct control of current from the platform. The present "box of tricks" on the car platform has continued too long a feature of every tramcar, and I am sure we all welcome the efforts of manufacturers to remove complications and substitute simplicity. Field shunting for control again comes well into view in consequence of commutation improvement and the combination of all these new ideas should result in greatly improved and more economical service.

BETTER COLLECTOR IS NEEDED

The trolley pole, so extensively adopted, has always appeared to me to be about the most unmechanical and absurd piece of mechanism it is possible to imagine. Recently some slight advance has been made in the adoption of sliding heads instead of wheels. From reports on the results of experiments carried out on the lines of one of our companies it appears that, from the traffic department standpoint, the sliding head (or skid) has certain advantages over the trolley wheel from the running point of view, as it dewires less frequently, but in the event of dewirement is not so readily replaced on the wire as the wheel. The rolling-stock department states that the skid has an advantage over the trolley wheel from the upkeep point of view, as not only has the cast-iron skid a considerably longer life than the wheel, but the maintenance of its parts is much less, and therefore it does not need the same attention.

Tests undertaken from December, 1921, to April, 1922, show the number of dewirements per 10,000 miles, for cars fitted with skids, to be 1.49, and for cars fitted with wheels, 2.35.

Further, the sliding head, owing to its lightness and the fact that it is not liable to foul the overhead equipment on dewirement, does not result in the same amount of damage as is occasioned by the wheel.

On the other hand, the overhead department reports that the wear and tear of the trolley wire with this type of head is about double that of the trolley wheel, but it is hoped that this can be reduced by the adoption of more suitable material or means for lubricating the wire.

I believe that if we could get the right type of designer and some insistent demand from tramway managers for better collector gear, a marked advance on the present apparatus would soon appear.

DESIGN OF CAR BODY LARGELY GOVERNED BY FARE COLLECTION

As to the "carriage work" of the car, much could be learned by studying the latest methods of body construction employed by motor-omnibus builders. The body, like the rest of the equipment, should be scientifically designed with the main object of cutting down weight.

The design of a car body is very largely governed by the system of fare collection. "Pay as you enter" or "Pay as you leave" is almost standard practice in America. The critic will say that "pay as you enter" has been tried and found a failure, owing to the British zone-fare system as contrasted with the flat-fare system and to the coinage and change difficulty. There is a great deal of truth in this, but I do not think it can be said that everything has been done to make "pay as you enter" possible.

The London United Tramways have recently developed and experimented with a one-man car. The car has been in regular service for several months and, beyond a few preliminary troubles due to its newness, has been running over light traffic routes with satisfaction both to the public and to the company.

In connection with the development of this car, we have of necessity had to give close attention to the possibility of the fare transactions taking place on the platform and have introduced several pieces of fare-collecting and ticket-issuing machinery. The use of machinery considerably simplifies the fare collection problem.

CONCLUSION

My object in making the foregoing remarks will have been achieved if those who are responsible for producing new ideas will note the trend of desirable evolution, and appreciate the fact that tramways will only become obsolete when new designs for tramcars have become impossible. I cannot but feel that if the tramway industry had had the benefit of the almost Herculean efforts of the automobile engineers during the last ten years we should have been running to-day a much more up-to-date type of vehicle and would be securing considerably better results.

It is somewhat lamentable, but none the less true, that what we require today was in reality invented many years ago, was tried and abandoned, generally because the inventors were a little ahead of their day, and if one might discreetly express an opinion the tramway manager is prone to lose heart in a new thing if immediate success is not attained. New ideas have generally got to go through their "teething period," and early designs are generally crude. If, however, we would only condemn those ideas that are fundamentally wrong and struggle with those that are only wrong in some detail, great progress would result.

The one-man car, which is so popular in the United States was, I believe, first tried in England and abandoned. Regenerative control was also introduced but did not flourish, and so it might be said of many other new ideas, not only affecting the tramway industry. The ideals of the early inventor are generally ahead of immediate practicability, but it is often worth while to review some past failures and hopeful attempts in the light of new conditions.

New England Street Railway Club

THE New England Street Railway Club will hold its October meeting on Thursday, Oct. 19, at the Copley Plaza, Boston. Two instructive papers will be read on iron and its products. Frank B. Walker, superintendent of maintenance of way Eastern Massachusetts Street Railway, will read an illustrated paper on "Mining of Iron in the Mesabi Iron Range," and F. A. Weymouth, sales metallurgist Bethlehem Steel Company, will read a paper on "Modern Steel Practice of Rolling Special Steel Tee and Girder Rails." The dinner will be held at 6:15 p.m.

Canadian Association Committee Appointments

MAJOR F. D. BURPEE has appointed the following special committees of the Canadian Electric Railway Association: Committee on standards, G. Gordon Gale, Hull, P. Q., chairman; D. E. Blair, Montreal, P. Q.; E. P. Coleman, Hamilton, Ont.; C. C. Curtis, Sydney, N. S.; W. G. Murrin, Vancouver, B. C. Committee on public relations, A. W. McLimont, Winnipeg, Man.; George Kidd, Vancouver, B. C.; W. J. Lynch, Quebec, P. Q.; E. W. Oliver, St. Catharines, Ont.; M. A. Pooler, St. John, N. B. Committee on safety, J. F. H. Wyse, Toronto, Ont.; C. C. Curtis, Sydney, N. S.; W. H. Garracott, Winnipeg, Man.; W. B. McRae, Toronto; R. M. Reade, Quebec.

Traffic Men Meet

SEVENTY traffic men, representing practically every interurban line in Kentucky, Indiana, Ohio and Illinois attended the annual meeting of the Central Electric Traffic Association at Webster Lake, Ind., recently. It has been voted that Webster Lake shall be the permanent meeting place for the association's annual sessions. Traffic policies for the coming year were discussed.

American Association News

Record Breaking Registration at Chicago

AT THE close of the Chicago convention of the America Association on Thursday evening, Oct. 5, the total registration had reached the gratifying total of 4,200. At least 3,000 persons in addition were admitted to the pier and the meetings by tickets, an innovation this year.

New Reports and Compilations

THE following special reports and compilations prepared by the Bureau of Information and Service of the American Association are now available to member companies in good standing:

Public Utility Laws—A summary of the laws creating the state public utility commissions, giving an analytical digest of the main provisions covering their jurisdiction and powers over transportation companies. This is the fifth installment of this compilation which was begun in June.

Wage Bulletin No. 127—A complete new edition of the association's wage bulletin showing wages paid trainmen by over 300 companies based on replies to a circular letter sent out during September.

Motor-Bus Operation — Operating cost figures and other data on the design and operation of motor buses collected in part by the committee on trackless transportation and in part gathered from other sources.

Traffic Ratios—A tabulation of the following ratios of nearly 200 companies: passengers carried per car-mile, revenue rides per inhabitant (riding habit), passenger revenue per revenue passenger (average rate of fare), car-miles per mile of revenue track, car-miles per car-hour (average speed), car-miles per car operated, passengers per car operated, etc.

Credit Where Credit Is Due

IN THE Convention Report Issue of the *Electric Railway Journal*, that for Oct. 7, credit should have been given to the Moffett Studio, Chicago, for the photograph of Edward Hungerford appearing on page 538.

The copyright line was also inadvertently omitted from the photographs of H. A. Wheeler, page 541, and Hon. W. W. Warwick, page 545, the copyright in both cases being held by Harris & Ewing, Washington, D. C.

Resolutions on President C. B. Holmes

THE following appreciation of the late Charles B. Holmes, past-president of the association, was presented to the executive committee at a recent meeting by a special committee composed of Gen. George H. Harries, John J. Stanley and H. W. Blake and was approved and adopted:

> Because of the departure of Charles Butler Holmes, one of the notable pioneers of our industry and a past-president of our association, the executive committee of the American Electric Railway Association herein records its appreciation of the valuable services rendered by him to this organization and to the public at large.
>
> Blest with uncommon foresight and financial courage, he was a national leader in successive developments of city transportation methods from the horse cars of the early '60s to the electrically operated latter-day equipment. His cable installation in Chicago was a highly important factor in the growth of that city.
>
> In principle and in practice he was an ardent advocate and supporter of the association and convention idea, and was president of this association in 1887-88, when the horse-to-electric transformation was in process.
>
> Sensible of our loss, we deeply regret his decease, and we tender to his surviving relatives our sincere sympathy.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Disorder in Buffalo

Striking Employees Again Cause Trouble—Manhattan Transit Operates Jitneys—Fare Hearing

Rioting has been resumed by striking employees of the International Railway, Buffalo, and their sympathizers and many loyal trainmen have been severely beaten and robbed within the last week. Lack of adequate police protection has forced officials of the company to be sworn in as special police and they are patrolling lines in outlying sections of the city in automobiles. Every effort apparently is being made to intimidate new employees of the company, who now are working at the regular scale of wages, 55 cents an hour. Despite the renewed disorder, passenger travel is increasing on all local and interurban lines.

TWO HUNDRED JITNEYS OPERATE

More than 200 jitneys charging a 10-cent fare started operating in Buffalo early in the week under the direction of the Manhattan Transit Company of New York, which claims to have authority under a charter granted in 1899 to the General Carriage Company. After operating twenty-four hours, the company suspended service in Buffalo pending a decision as to the legality of such service. Attorneys for the International Railway hold that the operation of such jitneys was in defiance of the laws of the state and the three injunctions issued by Justice Charles H. Pooley in Supreme Court. Joseph H. Hoadley, president of the Manhattan Transit Company; Henry D. Chapin and Charles N. Shaffer of New York were in Buffalo to watch the initial operation of the jitneys. The same interests recently operated in New York City.

Members of the Buffalo Jitney Owners' Association leased their cars to the New York company and each jitney carried signs indicating the destination and the words, "Operated by the Manhattan Transit Company of New York." The 16-cent taxis, however, continue to operate along the local lines of the International, but officials of the company claim to have evidence that the jitney-taxis are in almost every instance charging only a 10-cent fare. Injunctions now are being served on the owners of many jitney-taxis and as soon as the necessary evidence is secured by jitney riders employed by the International, arrests will be made. The local courts are clogged with jitney cases so that those demanding jury trials have to have their cases put off until late next March.

Suit has been brought against the Buffalo Jitney Owners' Association by the International in Supreme Court to recover financial losses alleged to have been sustained because of the illegal operation of jitneys since the start of the street car strike July 1. Counsel for the jitney owners has applied to Justice Harry L. Taylor in Supreme Court for an order to examine Herbert G. Tulley, president of the International, before trial.

Mayor Frank X. Schwab and Commissioners Graves and Kreinheder, the city's representatives on the committee which will negotiate with a committee of the International seeking to restore the 5-cent fare on the Buffalo lines of the company, went to Cleveland early in the week to investigate the service-at-cost plan in effect there. In 1919 the New York State Legislature passed an act enabling the city and the company to enter into a service-at-cost agreement, but Governor Smith vetoed it.

Formal application has been made to President Tulley of the International by the municipal authorities of the city of Lockport and the transportation committee of the Lockport Board of Commerce asking for the restoration of local trolley service in the city. Lockport has been without traction service since the strike was called July 1. If the International fails to comply with the request at once, the Lockport authorities threaten to take the matter to the Public Service Commission. There have been rumors in Lockport that the International is willing to surrender its local franchise except the right to operate through cars on the Buffalo-Lockport-Olcott lines.

TESTIFY ON VALUATION

The Public Service Commission held a preliminary hearing in Buffalo recently on the complaint of the city against the International seeking to restore the 5-cent car fare on the local lines. The fare now is 7 cents or four tokens for 25 cents. Colonel Pooley, who heard the evidence, indicated there will be no 5-cent fare pending the final determination of the case. The company's experts testified that the reproduction valuation of the company as of December, 1919, was $96,539,185, of which about $35,000,000 represents intangible value, for which the Public Service Commission makes no allowance. The International was represented by Coleman J. Joyce of Philadelphia, general counsel for Mitten Management. Inc.; Thomas Penney of Penney, Killeen & Nye, counsel for the International and former president of the company; Herbert G. Tulley, president, and E. J. Dickson, vice-president. The company's figures were prepared by a committee consisting of Charles Hansel, consulting engineer of New York, and other consulting experts.

Mayor Explains Attitude on Interurban Ouster

Declaring that the plan to bar interurban cars of the Detroit United Railway from the streets of Detroit, which will be placed before the voters on Nov. 7, is not due to any animus towards the Detroit United Railway. Mayor Couzens made the statement that the plan has been instigated to enable the street railway department to give the best service to its citizens at the lowest possible cost and at the same time to facilitate the coming in and going out of the city of interurban passengers.

The Mayor's statement was issued in answer to letters sent to his office in connection with the proposed elimination of interurban cars from municipal tracks. He cited that it was not generally known that Detroit streets are used to transport freight from Ohio points to Michigan points and expressed the belief that the people of Detroit do not want their streets used for freight traffic—at least not in train loads, the way the Detroit United Railway is transporting it now.

Although believing that freight traffic should be handled, the Mayor thinks it will have to be with lighter equipment, as light as the city's own urban cars so as to relieve in every way possible the tracks for comfortable and proper use by car riders. He further pointed out that interurban cars are constructed for open track use instead of for paved streets which makes the interurbans out of place on paved streets.

It is expected that the Detroit United Railway will pay the city $80,000 a month for the use of its tracks but that will not compensate the city for the destruction of trackage and the inconvenience caused the public. The question of fares is not of particular interest to the administration, but the preservation of streets and the facilitation of services for local riders as well as for interurban car riders are. The extent of damage already done to the municipal tracks by interurbans is evident according to the Mayor and can be ascertained by anyone interested.

No Special Legislative Session on Buses

Governor Miller said on Oct. 7 that he would refuse the Board of Estimate's request to call a special session of the Legislature to consider New York City's bus problem. The Governor said:

> The Board of Estimate has ample power for relief in the Transit Commission.
>
> If they want to play politics in New York they may do so. I certainly shall not.
>
> Has the Transit Commission the authority to give the city relief on buses?
>
> It has if the Board of Estimate refers the subject to it.

Resolution Calls for Traction Conferences

Officials of the Cincinnati (Ohio) Traction Company are called upon to confer with representatives of the Cincinnati Street Railway in a resolution adopted at a meeting of Mayor George P. Carrel's traction committee, with a view to accomplish "certain defined objectives."

These objectives are stated in the resolution, which was submitted by former Vice-Mayor Gilbert Bettman, to be a divorcement of the interlocking relationship that exists between the Cincinnati Traction Company and affiliated corporations. Another objective is to reduce the outstanding amount of securities that now are entitled to earnings under the 1918 franchise, agree to such modifications of the terms of the lease and of the 1918 ordinance as will enable the company's property to be efficiently operated and at a reasonable rate of fare.

The Mayor's committee will meet again Oct. 26, when a reply to the proposals made in the resolution is expected from the two companies. The resolution accompanied the report by Mr. Bettman, who was a member of the sub-committee named by Mayor Carrel which held conferences with officials of the two companies during the summer months.

Adoption of Transportation Act Will Produce Active Opposition

The activities of the California Real Estate Association in making an appeal to the real estate men of the State to support in the coming November election the so-called "Transportation Act," is meeting with considerable opposition from various cities in southern California. The Mayor of Los Angeles recently called a meeting of officials of numerous other cities in southern California to prepare to wage a fight against the proposed measure which is designed to give the State Railroad Commission exclusive power to grant franchises for the construction and operation of street, interurban and suburban railways, and bus lines.

The act, if adopted, will give the commission power to compel extensions of street railways into districts where the need existed. Neither the state nor municipal government has such power under present laws. Under present franchise laws governing street railways in California there is no power that can compel the extension of a street car line, consequently cities and towns throughout the State which are suffering from lack of extensions are being handicapped by inadequate service, according to the claims of the association.

Grand Rapids Set as Example

Convinced of the fact that the growth of the city of Saginaw is being retarded by the lack of reliable transportation service and that the actions of other cities in handling their transportation problems should be of especial interest to the citizens of Saginaw, the Saginaw *News-Courier* under date of Sept. 24 publishes an analysis on the overwhelming vote in favor of the new franchise in Grand Rapids.

The *News-Courier* says that its readers have been asking many questions on the neighboring city's adopting a franchise to run for thirty years. In order to answer the questions, the *Courier* wired the Grand Rapids *Press* "asking for a detailed and complete article telling how Grand Rapids thought and voted and of the arguments and information that played any part in the campaign."

Suggests Abolishment of Franchise Tax

Suggestion that the franchise tax against the Cincinnati (Ohio) Street Railway be abolished and that the company be placed in somewhat the same category as the automobile and truck owners of Cincinnati was made by Vice-Mayor Froome Morris in an address at the Lawyers' Club of the Cincinnati Chamber of Commerce. Mr. Morris said in effect that the franchise tax under the present service-at-cost ordinance of Cincinnati is illogical as it amounts to an indirect tax upon the car rider and he did not think it would ever make it possible to pay the franchise tax to the city. He declared that under the service-at-cost ordinance the railway did not owe the franchise tax unless it earned it and as a matter of fact it had never earned enough to pay the tax. It paid the tax only once and then it had to borrow the money to pay it. He said, however, that he did believe that the railway ought to be assessed a tax sufficient to keep the thoroughfares in first-class repair.

New Plan Submitted in Chicago

The All-Chicago Council on Sept. 29 submitted to the Chicago City Council committee on local transportation a comprehensive report providing for extensions of surface and elevated lines and the building of an initial subway.

The report recommends that the lines be municipal property, but operated and controlled by a regulatory body composed of representatives of the public, the employees, the municipality and the investors.

The total cost to carry out the All-Chicago Council's program was estimated at $154,575,000. Of this amount the initial subway system would cost $84,000,000; elevated line extensions, $44,875,000, and surface line extensions, $29,500,000. The plans call for 255 miles of surface line extensions, 179 miles of elevated line extensions and 58 miles of subway construction.

Plan for Trackless Trolleys to Be Heard.—A plan for a system of trackless trolley lines for Staten Island, calling for the expenditure of $4,235,000, was submitted to Mayor Hylan of New York recently by Grover A. Whalen, Commissioner of Plant and Structures. Of this amount, $3,000,000 is asked for 118½ miles of lines and cars, and $1,235,000 for an electric power plant.

Celebrates Thirty Years of Operation

On Sept. 22, 1892, thirty years ago, the first electric street cars were put in operation in the city of San Diego, Calif., and the occasion was observed on Sept. 22, 1922, by the company giving a dinner at the San Diego Hotel to the eleven surviving employees of the former date, General Manager Claus Spreckels and Assistant General Manager E. J. Burns representing the company as hosts. The honor guests were M. J. Perrin, superintendent thirty years ago, now assistant to the general manager; M. D. Ryder, dispatcher; J. A. Johnson, retired conductor; M. Thurnes, conductor; Robert Irwin, motorman; W. T. Laird, motorman; O. C. Newby, conductor; S. H. Holton, motorman; W. C. Enneking, dispatcher; A. J. Santee, retired motorman; W. Z. Allen, supervisor of trainmen.

The San Diego Electric Railway had its beginning in 1892, when the Spreckels interests purchased the property of the San Diego Street Car Company for $115,000 at receiver's sale, including the Park Belt Motor Line. The combined properties included 10.11 miles of track, laid with 30-lb. rails, one carhouse, stables, corrals and a repair shop located at Arctic and F Streets; a carhouse, stables and corral at Seventh and Market Streets; thirty cars, 147 horses, forty sets of double harness and 108 extra collars. The cars had a capacity of sixteen to twenty-five persons each.

The first electric cars were placed in operation on the morning of Sept. 22, 1892, on two of the company's routes—one from Fifth and L Streets to Fifth Street and University Avenue, and the other from the Santa Fe wharf, at the foot of Market Street, to Thirty-first and National Avenue. The first cars were double-deck, single-truck affairs.

The company now has a total single-track mileage of 78.6, owns 139 modern cars, operates 10.902 car-miles per day and hauls an average of 69,623 passengers daily. The total investment is placed at $4,239,391, and the monthly payroll is $52,706.

Detroit Commission Rents Buses

A fleet of motor buses has been rented by the street railway commission of Detroit from the Detroit Motorbus Company to give service to patrons of the south Chene line while reconstruction is in progress on Chene Street from Gratiot Avenue to the river. The emergency buses are hired on the car-mile rental basis, the revenues collected in fares going to the Department of Street Railways. The route to be followed is over Joseph Campau Avenue, the buses operating with the same rate of fare and the same transfer privileges as were in effect on the south Chene line. The temporary arrangement is expected to result in only a slight curtailment of motorbus service on Jefferson Avenue according to the president of the Motorbus Company.

Railway Problem Not Yet Solved

Although six months have passed since the Winnipeg (Man.) Electric Railway applied for a ten-year franchise extension no agreement has been reached between the railway and the city and no decision has been made on the question of submitting the issue to a public vote. A. W. McLimont, vice-president of the company, does not see the necessity of a plebiscite. In a statement he says that the question of the franchise extension is a business proposition and should be dealt with as such. The matter has been followed in previous issues of the *Electric Railway Journal*.

Winter Operation Expected in the Future

If the improvement in the operation of the Moncton Tramways, Moncton, N. B., is continued it is highly probably that in the course of the next few years winter operation will be resumed. Every effort has been made to aid the company in which Boston capital is largely interested into becoming a paying venture. The Moncton Tramways is one of the few street railways in the world that suspends operation in the winter. With the advent of the snow, the five cars of the company are stored in the carhouse.

The company was organized twelve years ago, laid rails, built a power plant and installed poles, etc. For several years the company operated the year round, but seven years ago, in view of the ever-rising cost of removing snow and of general operation in the winter, it was decided by the company to discontinue the service about December 1 and resume about April 1. Owing to the heavy outlay for removal of snow and other expenses contingent upon the cold weather period, the company had met with increasing deficits. During the winter and also in the summer motor buses are used on the lines of the street railway. The one-man car system is now in force.

It is considered very likely that the advent of the hydro-electric current from Musquash provincial station will have a decided effect on the company's prospects. It is not known as yet if the company will distribute the current in Moncton and vicinity, but present indications point that way.

Permits Harbor Frontage for Radials

The City Council of Toronto, Canada, has passed the agreement giving a fifty-year lease to the Ontario Hydro-Electric Power Commission of a six-track right-of-way over the harbor front land in the jurisdiction of the Board of Harbor Commissioners of Toronto. The nominal price will be $1 a year, with the Hydro-Electric Commission having control over radial railways.

The matter has been strongly contested for some time, the Toronto Transportation Commission opposing the agreement on the ground that it practically gave to the Hydro-Electric Commission the right to run electric cars within the city limits to the detriment of the city's interests represented by the commission. The Toronto Board of Trade and Board of Harbor Commissioners also opposed the agreement.

The agreement will have to be ratified by the Ontario Legislature before it becomes effective.

Instruction in Public Utilities in Austin

A course in public utilities will be offered at the University of Texas, at Austin, during the coming session. The course will be under the direction of Prof. W. M. W. Splawn, chairman of the Department of Economics and Sociology. The course will include lectures and instruction in the following topics: Demand for service on public utility companies; development of public utility companies; problems of financing; problems of management; problems of control; regulation of service; rate fixing; valuation.

Rerouting System to Be Planned

During the coming winter the Jamestown (N. Y.) Street Railway will work out a system of rerouting which the company hopes to put into effect in the following spring. According to A. N. Broadhead, president of the company, the idea is in line with the company's plan of connecting various parts of the city without the delay and inconvenience caused by transferring from one car to another. "In other words," said Mr. Broadhead, "we intend to establish a system whereby it will be possible for persons residing on the south side, for example, to make the trip to the north side without changing cars at the central terminal." This plan will improve the service in Jamestown materially.

Decreased Number of Accidents Reported

A report just rendered by the Los Angeles Board of Public Utilities shows that street railway accidents in Los Angeles are decreasing. This showing is exceptionally favorable in spite of the fact that traffic in the streets in Los Angeles is greatly increasing. The number of accidents on street railway lines in Los Angeles during the year ending June 30, 1922, was 597 fewer than during the previous year. The engineers of the board attribute this decrease to the starting of "no left-hand turns" at the busiest of the down-town street intersections, to the installation of the automatic traffic signal devices at various street intersections through the busy section of the city and to safety campaigns conducted by various civic bodies, including the Chamber of Commerce, the Safety Council and the Los Angeles Traffic Commission.

The report of the board showed that for the year ending June 30, last, there were 17,912 reported accidents on street railway lines in Los Angeles as compared with 18,509 during the previous year. Of the total of 17,912 accidents, collisions of street cars with automobiles numbered 13,022; miscellaneous accidents, 1,198; accidents to persons alighting from street cars, 1,544; collisions of street cars with other vehicles, 651; accidents to persons boarding street cars, 966, and collisions of street cars with pedestrians, 531.

News Notes

Votes Against Station Plans. — The City Council of Connersville, Ind., has voted against the station at Sixth Street and Western Avenue proposed by the Indianapolis & Cincinnati Traction Company.

To Wage Ceaseless War on Carelessness.—According to the "Subway Sun" published now and then by the Interborough Rapid Transit Company, New York, N. Y., the company has enlisted in the war against carelessness. This declaration was made in view of "Safety Week," which was conducted in New York City Oct. 8-15.

Wages Remain Unchanged.—After two weeks' negotiations an agreement was reached on Oct. 10 between the Springfield (Ohio) Street Railway Company and the carmen's union continuing the present wage scale for another year and leaving unchanged the working conditions. The wage scale at present is 42, 44 and 46 cents an hour depending on the length of service.

"How Come" Will Give You the News. — Bulletin boards containing cards giving information concerning the activities of the company for the benefit of the patrons are being placed in all of the cars operated by the Indiana, Columbus & Eastern Traction Company. General Manager Bleecker of the company said that the cards would be contained in box frames in the front of each car, and that the cards would be changed each week. "How Come" has been adopted as the slogan to head the cards. This slogan will appear at the top of each card, and underneath will be a terse sentence giving some vital fact concerning the company's operations.

P, A. Y. E. Plan Altered.—To satisfy protesting citizens a change has been effected in the pay-as-you-enter system on the North Birmingham line of the Birmingham Railway, Light & Power Company, Birmingham, Ala. The seating arrangement in the cars used prior to the pay-as-you-enter system will be in effect again, and according to J. S. Pevear, general manager, the entrance payment plan is continued, but negro passengers will occupy the front seats and exit through the front door and white passengers the rear seats and will exit through the rear door. Patrons are still fighting for separate entrances for the races.

Financial and Corporate

Milwaukee Gold Bonds Offered

In order to retire $7,822,000 outstanding funded debt, to reduce floating indebtedness incurred for property additions and to provide funds for further additions to the company's plants and system the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will issue $12,500,000 of its refunding and first mortgage gold bonds. These bonds will bear interest at the rate of 5 per cent and will mature June 1, 1961. The bonds are offered, subject to prior sale, at 92¼ and interest, yielding about 5.50 per cent. The refunding and first mortgage 5 per cent bonds will cover all the property of the company, subject to underlying liens, and, under the provisions of the indenture, after Dec. 1, 1931, will become a first lien on the entire mortgaged property. The physical value of the company's property, as determined by the Wisconsin Railroad Commission, aggregates $58,151,284, as against a total of refunding and first mortgage bonds and underlying issues in the hands of the public of $36,547,000. Following the funded debt are over $17,000,000 preferred and common stocks representing an equity based upon this valuation of more than $19,000,000. Regular dividends on the preferred stock have been paid for the past twenty-two years and dividends averaging 8 per cent per annum have been paid on the common stock every year since 1903.

Merger Effected

The Northwestern Pennsylvania Railway, the Crawford County Railways, the Northwestern Connecting Railway and the Peoples' Incandescent Light Company on Oct. 1 were merged into and with the Northwestern Electric Service Company of Pennsylvania. All operation of these properties will be conducted hereafter under the corporate name of the Northwestern Electric Service Company of Pennsylvania. Under the merger terms the new company acquires all the properties and assets and assumes all the liabilities of the above companies.

Arguments Heard on Indiana Consolidation

The Indiana State Supreme Court heard oral arguments on the validity of the consolidation of seven Indiana light and traction companies into the Indiana Electric Corporation, which was authorized by the Indiana Public Service Commission last January, and later declared by Judge Linn D. Hay of Indianapolis to be unlawful. In summarizing before the court the opposition of the cities of Indianapolis and Kokomo to the formation of the new company, attorneys declared the Public Service Commission had no power or authority under the law to authorize the merger and that the order therefore was void. Attorneys speaking for the corporation said the utilities law of the state permits any corporation to buy another corporation, regardless of whether the companies planning to merge provide similar service. The companies united by order of the commission are the Merchants Heat & Light Company, Indianapolis; the Elkhart Gas & Fuel Company, Elkhart; Valparaiso Lighting Company, Valparaiso; Indiana Railways & Light Company, Kokomo; the Putnam Electric Company, Greencastle; the Cayuga Electric Company, Cayuga, and the Wabash Valley Electric Company, of Clinton.

Submits Twelfth Annual Report

Gross earnings of the operating companies of the Kentucky Securities Corporation, Philadelphia, Pa., for the year ended June 30, 1922, were $1,549,241. The net surplus available for depreciation, corporation expenses and dividends was $338,012. For the fiscal year ended June 30, 1922, $163,447 was required for the corporation operating expenses and the 6 per cent dividend on the $2,271,598 preferred stock outstanding, leaving a balance of $174,565, or the equivalent of $8.50 per share on the common stock.

In the annual report of the directors to the stockholders President P. M. Chandler said that the directors had declared an initial dividend of 1 per cent on the common stock out of earned surplus payable Oct. 2. The regular quarterly dividend on the preferred stock of 1½ per cent was also declared. He stated a large amount of the preferred dividend scrip had been purchased and cancelled and funds had been set aside for the payment of the remainder, upon presentation on or after Oct. 2, 1922.

Increase in Net Earnings Reported

The seventh annual report of the board of directors of the Barcelona Traction, Light & Power Company, Barcelona, Spain, for the year ended Dec. 31, 1921, was recently submitted to the shareholders. It states that trade depression seriously affected business in Barcelona, but that toward the end of the summer there was a marked renewal of activity. The operating results of the tramways company showed an increase in gross earnings of nearly 18.64 per cent over those of the previous year, but owing to a large increase in operating costs, the increase in net earnings was only about 13.35 per cent. Considerable work was done during the year on the railway including the relaying of track and extending the workshops and their equipment.

Gives Permission to West Penn Subsidiary to Acquire Electric Plant

In the race between the West Penn Company and the Penn Public Service Company, electric corporations of Pennsylvania, for control of the strategic position occupied by Oakland and Garrett County, the West Penn Company appears to have won. The West Penn Company now has control of the electric system formerly known as the Hagerstown & Frederick Railway and its subsidiaries.

The Public Service Commission filed its opinion and orders in the case, giving the West Penn Company, through its subsidiary, the West Maryland Company, all that had been asked. That was permission to acquire the municipal electric plant at Oakland, permitting the West Maryland Company to exercise all the rights, privileges and franchises granted it by the Mayor and Town Council of Oakland and authorizing it to execute a mortgage upon the property it already has arranged to acquire.

Although only $40,000 was involved in the sale of the property, the case was followed with greater interest than any other which the commission has been called upon to consider for some time.

Improved Condition Reported

The Nova Scotia Tramways & Power Company, operating the street railway system in Halifax, has reduced operating expenses so that the railway is now being operated at a substantial profit. A contrast is afforded in the figures submitted for the month of August in 1921 and 1922.

In August, 1922, the gross earnings were $100,143; operating expenses were $70,745. After bond interest and amortization charges were paid, the surplus for the month was $7,309. For August, 1921, there was a deficit of $2,590.

The improvement in earnings is attributed largely to the installation of Birney safety cars. The use of these cars has cut down the number of trainmen needed and their operation is said to have resulted in fewer accidents being recorded.

The Nova Scotia Tramways & Power Company was taken over by Stone & Webster, Boston, two years ago.

J. G. White Takes Control.—A group composed of Marshall Field, Glore, Ward & Company, Spencer Trask & Company, Estabrook & Company, Raymond M. Smith & Company and associates, and interests connected with the J. G. White Management Corporation have acquired control of the Richmond Light & Railroad Company, New York, N. Y. It is the intention of this group to make every effort to effect a sound plan of reorganization and to give the best possible service to Staten Island. As plans for doing this are developed, the public will be informed with regard to them.

Security Holders Accept I. R. T. Reorganization Plan

Holding Company Wiped Out, Five-Cent Fare Guaranteed, Elevated Lease Modified and Public Representation on Board of Directors Provided in the Plan Presented to New York Commission for Approval

THE New York Transit Commission on Oct. 8 made public a communication from the Interborough-Metropolitan bondholders committee asking the commission's formal approval of plans that mean practically the reorganization of the Interborough Rapid Transit Company. The commission has set Oct. 17 as the time for the statutory hearing on the application.

The plans for the reorganization of the Interborough Company are the result of pressure to that end exerted by the Transit Commission from almost the first month of its existence. In its effort it has had at all times the able and effective support of Federal Judge Mayer.

In the course of conferences held with the representatives of the Interborough Company, the Manhattan Company, the Interborough Consolidated Holding Company and the various groups of security holders held last spring, the commission, without committing itself in the matter of final judgment, laid down certain fundamental conditions that it would, in any event, require to be met. Those were:

> 1. That it should not contemplate any increaes of fare beyond 5 cents; or any reduction of the joint service for a 5-cent fare now given upon Interborough and Manhattan lines.
>
> 2. That it should provide funds for new cars, additional power service and other equipment necessary to meet the present and future service orders of the commission. It is estimated that the cost of such new equipment will be in the neighborhood of $15,000,000.
>
> 3. That is should do away wholly with the Interborough Consolidated Holding Company—the successor of the Interborough-Metropolitan—with its $114,000,000 of securities.
>
> 4. That it should limit the possible future dividends of the Interborough to 7 per cent, to be payable only when earned. This would prevent the declaration and payment at any future time of excessive dividends which, during the war period, went as high as 20 per cent.
>
> 5. That no dividends whatever should be paid upon Interborough stock during the next five years, all revenue, within the proposed limitation, to be devoted exclusively to service.
>
> 6. That it should eliminate the fixed 7 per cent return on Manhattan stock paid by the Interborough by way of rental for its elevated properties, amounting to $4,200,000 a year; and that the rental paid the Manhattan be reduced to a reasonable rate, payable also only in years in which it is earned. The fixing of this rate at 3 per cent for the first year means a reduction of the amount of rental to be paid to $1,800,000, and a gain of $2,400,000, from this source alone, for additional service.
>
> 7. That it should provide for public representation in the new board of directors; and finally
>
> 8. That it should be treated as a preliminary step in the carrying out of the commission's broader plan for the municipal ownership and unification of all the useful transit properties in the city.

The commission also made public a letter signed by Grayson Murphy as chairman of the Interborough-Metropolitan bondholders committee, but written on behalf of all the parties to the settlement. That letter reports the result of the canvas of security holders which has proceeded throughout the summer, and indicates that the companies are prepared to meet all of these conditions.

In concluding its statement the commission said:

> Thus, through the joint efforts of the Transit Commissioners and Judge Mayer, the security holders have already virtually agreed to changes of corporate structure and policy that should do away with even the possibility of a repetition of the financial abuses that in past years have aroused the just resentment and criticism of the public.
>
> The commission at this time can make no comment concerning its official attitude toward the reorganization plan as a whole. All of its phases will require examination. Prompt attention, however, will be given the application, and the decision will not be delayed.

The communication of Mr. Murphy to the commission is very largely a reiteration of the statement of the commission with respect to what is hoped to be accomphlished. He does, however, stress the fact that provision is made for the public authorities to have a voice in the management of the properties through representation on the board of directors or otherwise. Mr. Murphy reiterates the fact that the plan preserves the 5-cent fare and will make it possible for the Interborough subway and elevated lines to be operated efficiently at that rate of fare and kept together as one system. He explains that this has been accomplished through the reduction of the Manhattan rental, which, in respect of all stock subject to the plan, becomes payable only out of earnings and the suspension for a five-year period of the sinking fund requirements of the Interborough Company's first and refunding mortgage.

The Interborough Consolidated Corporation—the holding company—will cease to hold any stock in the Interborough Rapid Transit Company and will go out of existence.

As a result of the elimination of the Interborough Consolidated Corporation the following securities disappear:

Interborough - Metropolitan 4½ per cent bonds......	$63,808,000
Interborough Consolidated Corporation preferred stock	45,740,500
Interborough Consolidated Corporation common stock without par value stated at $5 per share...	4,663,134
Total	$114,211,634

In place of these securities there will remain only the original $35,000,000 of Interborough Rapid Transit Company stock, which will be held by the stockholders, instead of by a holding company.

As regards other phases of the matter, Mr. Murphy says:

> No dividends can be paid upon the Interborough Rapid Transit Company stock for five years and in no year can the dividend exceed 7 per cent. Thus provision is made against Interborough stock being a speculative security and against the payment of excessive and improvident dividends. Any earnings in excess of 7 per cent upon the Interborough Rapid Transit Company's stock must remain as a reserve against lean years or for use for additions and betterments, or to retire capital securities, thereby reducing the fixed charges resting upon the enterprise.
>
> ### FIXED CHARGE ELIMINATED
>
> The Manhattan stock dividend rental is eliminated as a fixed charge as to all Manhattan stock subject to the plan, as it becomes payable only out of earnings. The obligation to pay dividends upon Manhattan stock in excess of 3 per cent for the first year, 4 per cent for the second year and 5 per cent for succeeding years (but never in excess of 7 per cent) will arise only in case of the payment of dividends upon the Interborough Rapid Transit Company's stock.
>
> Additional capital for the new equipment and the improvements and additions deemed by the commission necessary to provide the public with adequate service is secured through the sale of $10,500,000 of ten-year 6 per cent notes (which it is hoped ultimately to retire by the use of first and refunding mortgage 5 per cent bonds), and also by such a reduction in fixed charges as to justify the expectation that substantial surplus earnings will be available for capital purposes.
>
> The committees which formulated the plan, and the company, being heartily in accord with the principle that the public authorities should be represented in the management of the enterprise, have made provision for certain of the directors of the Interborough Rapid Transit Company to be chosen by your commission and by the City of New York if they elect to avail themselves of the opportunity. Unfortunately there is no present legal authority for such election and we ask your co-operation in an effort to secure the necessary legislative authority. In the meantime a voting trust agreement embracing all the stock of the Interborough Rapid Transit Company subject to the plan will contain effective provision whereby your commission and the city may nominate three directors. This voting trust agreement is submitted herewith for your consideration especially with respect to those provisions which deal with the election of directors to represent your commission and the city.
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> ### HOLDERS SAVED FROM HEAVY LOSSES
>
> The consummation of the plan, avoiding as it does a receivership and the disintegration of the system, which would otherwise be inevitable, saves the security holders from very heavy losses. This is especially true in respect of the Interborough-Metropolitan 4½ per cent bonds, of which there are about 6,300 holders, of which nearly half are women, estates, trustees, savings banks, trust companies, insurance companies and educational and charitable institutions. The holders of these bonds have received no benefits from the dividends in excess of 9 per cent upon Interborough Rapid Transit Company stock paid during the years of liberal earnings, inasmuch as the return upon the bonds was limited to 4½ per cent. Yet as soon as earnings declined, default in the payment of interest upon these bonds was made.
>
> This default has continued for more than three years, thus imposing great hardship upon the bondholders. For a time it seemed impossible to save anything out of the wreck for these bondholders, but the present plan, providing, as it does, for the distribution of the stock of the Interborough Rapid Transit Company among the bondholders, affords them substantial ground for hoping that if conditions improve they will receive a reasonable return upon the investment represented by their stock—a return limited to 7 per cent upon the stock, which is only 3½ per cent upon the surrendered bonds. The 4,400 holders of Manhattan stock, the 18,000 holders of Interborough 5 per cent bonds and the 7,000 holders of Interborough 7 per

cent notes, while not in so precarious a position as the holders of Interborough-Metropolitan 4½ per cent bonds, are saved the delay, confusion and expense and probable interruption of income which would have resulted from an Interborough-Manhattan receivership.

Provision is made for paying off 10 per cent of the $38,144,000 of Interborough Rapid Transit Company notes (most of them bearing 8 per cent interest) and converting the balance into ten-year notes with interest reduced to 7 per cent. It is confidently expected that the conversion privilege offered to holders of the extended notes will result in their conversion before maturity into 5 per cent first and refunding mortgage bonds maturing in 1966.

ADVANTAGE TO THE PUBLIC

No one can doubt the great advantage to the city and to the public in avoiding the disintegration of the Interborough-Manhattan system and in insuring the continued operation of the subway and elevated lines as a single system with a 5-cent fare.

Finally, we submit that the present plan may fairly be regarded as an important step in the direction of carrying out the commission's comprehensive plan embracing all the traction properties of Greater New York.

The saving of the Interborough-Manhattan system from receivership and dissolution will make possible a much earlier consideration of the commission's plant than would otherwise be possible. If the receivership, which for a time seemed inevitable had come there would have been a disintegration of the system, the mortgage securing the Interborough Rapid Transit Company bonds would have been foreclosed and the Manhattan Company would doubtless have resumed possession of the elevated lines. All the lines would probably have been operated by receivers for a considerable period with greatly increased expense. It would probably have taken at least two or three years to settle by litigation the complex controversies between the holders of the various classes of securities which a receivership would have precipitated and the settlement of which would have necessarily preceded action by the security holders upon the Transit Commission's plan.

James F. Sheffield, special master, sold 339,128 shares of capital stock of the Interborough Rapid Transit Company at public auction on Oct. 11. The stock was held as collateral by the Empire Trust Company as successor trustee of the Windsor Trust Company under a trust agreement made in 1906 with the Interborough-Metropolitan Company, which was succeeded by the present Interborough Consolidated Corporation. The sale was in accordance with a decree of foreclosure signed by Judge Julius M. Mayer of the Federal Court.

Capt. D. Raymond Noyes, representing Grayson-M. P. Murphy, Frank L. Polk, and Guy E. Tripp, voting trustees under the reorganization plan, was the only bidder. His offer was $1,750,000. It was accepted by Mr. Sheffield, who under the terms of the foreclosure decree has two days within which to report the result of the sale to Judge Mayer.

New Issue in Prospect

President R. S. Hecht of the New Orleans Public Service Corporation, who returned from New York on Oct. 7, where he went to look after the matters connected with the issuance of $12,000,000 of bonds of the new corporation, is of the opinion that the new issue will be in readiness for the market within a week. A meeting of the board has been called for the purpose of approving the issue. It is understood that the new 4½ per cent bonds may not yield 6 per cent, as agreed, and may cost the company less than 6.70 per cent. That the new bonds, at first, will not sell at par is admitted in local financial circles, though their attractiveness as an investment will grow stronger even at a low rate of interest, as the earnings of the new company increase through rehabilitation of the property and its more economical operation and maintenance.

Financial News Notes

Receiver Appointed. — S. H. Eagle, banker, has been appointed receiver for The Gallipolis & Northern Traction Company, Gallipolis, Ohio.

Authorizes Issue. — The Topeka (Kan.) Railway has been authorized by the State Public Utilities Commission to issue $66,793 in car trust notes which will be used for the purchase of ten new one-man Birney cars.

Increases Surplus. — The Brooklyn (N. Y.) Rapid Transit Company reports a surplus of $269,067 for August operation and a surplus of $604,012 for the two months ended Aug. 31, 1922. For the same two months' period of 1921 the surplus after charges amounted to $487,284.

Will Purchase Bonds.—The Market Street Railway, San Francisco, Calif., has sent a notice to holders of the first consolidated mortgage 5 per cent gold bonds that it will purchase for the sinking fund an amount of bonds sufficient to absorb $160,000. Sealed bids were asked to be presented on or before Oct. 10.

Gold Bonds for Sale.—Halsey, Stuart & Company, First Wisconsin Company and Blodget & Company are offering $5,495,000 of the Wisconsin Public Service Corporation first lien and refunding mortgage 6 per cent gold bonds Series "A." The price is 99½ and interest to yield about 6.05 per cent. This issuance has been authorized by the Wisconsin Railroad Commission.

New Company Formed.—The Cumberland Traction Company has been formed with $100,000 capital to take over the operation of the trolley lines between Bridgeton and Millville, N. J. Clayton McPherson, who has been operating the line recently, is president, with General Manager William L. Martin, vice-president; Gus C. Westcott, secretary, and George Maier, treasurer.

Earnings Increase.—The Alabama Traction, Light & Power Company, New York, N. Y., reports an increase of $90,748 in gross earnings for August, 1922, against August, 1921, and an increase of $500,646 for the twelve months ending Aug. 31, 1922, over the same period in 1921. Net earnings for the twelve months ended August of this year amounted to $2,600,185, an increase of $317,200 over the same period in 1921.

Gold Certificates Offered.—Halsey, Stuart & Company, New York, N. Y., are offering $1,725,000 of the Northwestern Elevated Railroad, South Side Elevated Railroad and the Metropolitan West Side Elevated Railway 6 per cent equipment trust gold certificates, Series C-1 Trust of Sept. 1, 1922. The price ranges from 100 and dividends to 100.48 and dividends. The certificates will be dated Sept. 1, 1922. The issuance has been authorized by the Illinois Commerce Commission.

Company Incorporated.—Lima City Street Railway has been incorporated with $750,000 authorized capital. The incorporators are D. J. Cable, C. M. Cable, John L. Cable, Catherine Werline and F. A. Bundy. D. J. Cable says that the incorporators named are not the actual interests back of the plan to buy the local Ohio Electric lines and to secure a new franchise.

Mortgage Debentures Offered. — Greenshields & Company, Montreal and Greenshields, Wills & Company, New York, are offering $500,000 of the Montreal (Que.) Tramways 5 per cent perpetual mortgage debentures. The market price will yield about 6.25 per cent. Sufficient revenue to pay interest on these debentures is assured to the company by a contract between the City of Montreal and the company ratified by the legislature.

Gold Debenture Bonds Offered.—Bonbright & Compan,y Inc., and the Electric Bond & Share Company are offering $7,500,000 of the American Gas & Electric Company's 6 per cent gold debenture bonds. The bonds dated May 1, 1914, and due May 1, 2014, are offered at 100 and accrued interest to yield about 6 per cent. The proceeds from the sale will be used to reimburse the company for the cost of properties recently acquired and for other corporate purposes.

Gold Bonds Offered.—Stone & Webster, Inc., are offering $1,250,000 in first mortgage sinking fund 5 per cent gold bonds of the Norfolk & Portsmouth Traction Company assumed by the Virginia Railway & Power Company. The bonds are dated May 10, 1906, and are due June 1, 1936. The price is 93 and interest to yield about 5¾ per cent. The Virginia Railway & Power Company assumed the bonds of the Norfolk & Portsmouth Traction Company when the two properties were merged in 1911.

Net Income of $1,315,135.—According to the report of the Philadelphia (Pa.) Rapid Transit Company a net income of $1,315,135 was realized for the eight months ended Aug. 31, 1922. This figure compares with $936,583 for the eight months ended Aug. 31, 1921. The passenger revenue for January-August period of this year amounted to $27,249,098, against $27,555,073 for the same period a year ago. The total number of passengers carried in the eight months period of this year was 554,621,826, an increase of 1,152,000 over the traffic from January-August, 1921.

Traffic and Transportation

Commission Orders Increase and Decrease

In Utica Rates Are Raised from Six Cents to Seven Cents, While in Syracuse the Rates Are Ordered Lowered from Eight Cents to Seven Cents

DECISIONS have recently been handed down by the Public Service Commission of New York affecting the rates of fare charged by the New York State Railways in Utica and Syracuse. The actions were separate and distinct. In Utica the rate of fare has been 6 cents, while in Syracuse the rate has been 8 cents, with four tickets for 29 cents. Under the new ruling the commission, pending the finding of a valuation for the Utica property, has decided that a 7-cent fare shall be charged in that city, this rate being deemed necessary to preserve the property under the rate base found in the decision of Sept. 15, 1921. In the Syracuse case a reduction has been ordered in the cash fare from 8 cents to 7 cents, with no mention made of any change in the ticket rate. These cases have been referred to previously.

On Sept. 15, 1921, the commission made an order dismissing the application of the New York State Railways to increase passenger fares in Utica and vicinity. The company sought a review of the commission's decision and, as a result, the Supreme Court, Appellate Division, remanded the case to the commission for further consideration. Particular emphasis was placed by the court upon what it believed to be the commission's omission in not giving due attention to the estimates of overhead.

Shortly after the decision of the Appellate Division, the company filed with the commission a petition for permission to increase passenger fares in Utica to 7 cents, and to file a schedule on short notice. A hearing was held on Aug. 16, 1922, which is to be regarded as a hearing in reconsideration of the case as remanded to the commission, but with particular reference to the establishment on short notice of the 7-cent fare in the Utica zone.

Figures submitted by the company for the ten months from Sept. 1, 1921, to June 30, 1922, indicated that there had been a deficit for the ten months' period of $158,760.91 under the amount to which the company believed itself entitled on the basis of an 8 per cent return upon the rate base established by this commission in its opinion of Sept. 15, 1921, namely, $2,864,000.

The city of Utica submitted a brief setting forth its views upon the points at issue in the application for a 7-cent fare. The company submitted no brief, resting its case upon the computations set forth in its statement of earnings. The city made the following claims:

1. That the item general amortization should be excluded from the company's statement of expenses;
2. That wage reductions effective June 15, 1922, will reduce operating expenses;
3. That complete one-man car operation will reduce expenses;
4. That increased speed of operating the cars will reduce expenses;
5. That the cost of repairs to equipment and of power due to poor condition of track is abnormal;
6. That operating expenses are heavier the first six months than during the whole year and consequently that this period is not a fair index of an entire year's operation;
7. That taxes attributed to territory outside of the Utica 6-cent fare zone should be deducted.

The city's claims concerning items one and two, the commission believed to be well sustained. In respect to No. 1, that the item, general amortization, should be excluded from the company's statement of expenses, the commission said there should be no dispute. This item had been disallowed in other rate proceedings affecting the company. It was disallowed by the commission in its opinion of Sept. 15, 1921, on the ground that general amortization for depreciation that occurred prior to 1908 should not be charged to operating expense account, as this burden does not properly fall on car riders of 1921. The amount to be deducted on this account will be $17,050.

In respect to item No. 2, that wage reductions effective June 15, 1922, will reduce operating expenses, the commission was satisfied that a reduction, amounting to $14,250 would be effected, and due consideration was given to it.

In respect to the other items before mentioned, namely, Nos. 3, 4, 5, 6 and 7, the commission did not believe the city's contentions had been sustained.

In respect to the rate base, the commission said that it had already been noted that the company in support of its application for an increase of fare to 7 cents based its calculations of deficiency in revenue on the sum of $2,864,000, this being the rate base fixed by the commission in its decision of Sept. 15, 1921. The city contended that this rate base was excessive, on the ground that there was allowed to the company in arriving at the rate base the sum of $434,000, which represented a capitalized deficiency, in earning an amount necessary to represent the accrued depreciation figured upon this property, namely: $1,335,721. The city based its demand for the elimination of this capitalized sum of $434,000 upon the decision of the Supreme Court of the United States in the case of the Galveston Electric Company vs. the City of Galveston, decided April 19, 1922. On this point the commission said in part:

> It is open to very serious question whether the decision in the Galveston case applies to this particular instance. If the contention of the city is accepted it means that the rate base would have to be reduced $434,000. The commission should not undertake to do such a thing in the face of the judgment of the Appellate Division until the entire rate base has been reconsidered. We are unable to accept the city's view on this point, and for the purposes of this application will let the rate base stand as fixed in the decision of Sept. 15, 1921.

The commission also rejected the plea of the city not to allow a rate of return in excess of 6 per cent, holding that the 8 per cent used in the commission's decision of Sept. 15, 1921, should be allowed.

The following table sets forth the basis upon which the commission decided a rate of fare should be computed:

RESULTS OF OPERATIONS, SEPT. 1, 1921-JUNE 30, 1922

PER EXHIBIT NO. 87	Sept., 1921-June, 1922 (10 Months)
Operating revenue	$927,834
Operating expenses:	
Maintenance	$173,227
Power	118,732
Transportation	389,648
General (including traffic)	102,005
Depreciation	61,966
Total	$845,578
Taxes	52,596
Total expenses and taxes	$898,174
Operating incomes (excess of revenue-return)	$29,660
ADJUSTMENTS AND RATIOS	
Add:	
General amortization erroneously included in expenses	$17,050
Wage reductions June 15, 1922, to be deducted	14,250
Revised operating income	$60,960
8% on investment $2,864,000	190,933
Deficiency	129,973
Per passenger[1]	.0086

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[1] Computed on basis of 1,500,000 per month.

In conclusion the commission said:

> There is shown a deficiency of 0.86 of a cent per passenger on a rate base which the commission is called upon to reconsider on the ground, as stated by the court, that "The incomplete method of valuation has necessarily reduced the total valuation of the relator's property so substantially as to make it uncertain whether an adequate return on such property has been allowed." It would, therefore, appear that pending a determination of this case, which involves the finding of the valuation of the company's property, there should be an increase of rate, sufficient upon the rate base found in the decision of Sept. 15, 1921, to preserve the property of the company. Such increase requires a 7-cent fare, which should be the rate to be charged and collected until the final determination of this case.

In its review of the Syracuse case the commission explains that the rate of fare on street surface railroads in cities of the State was fixed by the legislature at 5 cents and this statutory rate prevailed in the city of Syracuse until the former commission in November, 1918, permitted and authorized an increase of fare to 6 cents. There was no valuation of property in that case, and the relief given the company was a matter of emergency, and stated by the commission to be warranted on the basis of its funded debt. The 6-cent fare prevailed until the former commission upon the petition of New York State Railways authorized and permitted a fare of 8 cents, and half fare to children, and provided for the issuance of four tickets or tokens for 29 cents. This order became effective April 27, 1921, and the rate fixed by it is the one against which the complaint is filed. In conclusion the commission said:

The company is entitled to a reasonable average return upon the value of the property actually used in the public service. We conclude that 8.0 per cent is a reasonable average return to the company upon the value of its Syracuse lines. In determining the return there are several elements which must be considered—cost of money, a regard for surplus and contingencies, the use of the reserve by the company which will be created by the allowance of charges to operating expenses for replacements and renewals, extension of paving assessments over a period of ten years at 5 per cent interest, the allowance of Federal income tax as an operating expense; and the further economies which may be effected in the management of this company. The commission prefers to encourage good management rather than to penalize imprudent management.

The determination of this question, as we have stated, depends upon the amount applicable for return after deducting from revenue expense and taxes as outlined in the early part of this opinion.

Using the valuation of the property which we have allowed, we make a computation as follows:

Total operating revenues at 8-cent fare		$2,428,489
Deductions:		
Revised operating expenses	$1,512,752	
Taxes	141,855	1,654,337
Income available for return....		$774,152

This is a return of 8.54 per cent on $9,038,050 valuation which we have allowed on this property. This exceeds a fair return and the 8-cent fare complained of is therefore unreasonable and unjust. The duty is therefore upon us under the requirements of the statute to determine the fair and just rate to be observed as the maximum to be charged for service to be performed by this company.

Using the rate base reached of $9,038,050 and allowing a return of 8 per cent...........	$723,044
Revised operating expenses....	1,512,752
Taxes	141,585
Total	$2,377,381
Deduct revenue from other operations	67,539
Leaves a balance of revenue required to meet cost of service.	$2,309,842

When the 6-cent fare went into effect in November, 1918, there was a falling off in passengers during the following year of a trifle less than 10 per cent. In the year ending March 31, 1920, there was a material increase and in the year ending March 31, 1921 (the 6-cent fare continuing) the largest number of passengers in the history of the company were carried. In April, 1921, the 8-cent fare went into effect and the traffic fell off in the year ending March 31, 1922, about 20 per cent. For the year ending July 31, 1922, there was a general decrease of passengers of nearly 200,000. The general industrial depression commenced in Syracuse in September, 1920, and continued to March, 1922, before relief therefrom was apparent. This undoubtedly had a considerable effect upon passenger traffic. As a further cause of reduction in traffic the company assigns the increased use of automobiles.

The increase of fare and these other causes undoubtedly combined to decrease passenger traffic. The automobile will continue without question to affect it to a considerable extent, particularly during summer months. With a restoration of business, with a reduction in rate, we have estimated that the number of full fare passengers for the coming year will be at least 33,199,000. Dividing the cost of service, $2,309,842, by this number of passengers gives an average rate of fare of 6.96 cents, or substantially 7 cents.

It is the duty of the commission, therefore, to establish a 7-cent cash fare, effective for a period of six months commencing Oct. 1 next and until the further order of the commission.

In the original fare case the company presented four sets of valuation figures varying from $9,101,187 to $15,795,415, the latter based on prices then prevailing. The city contended for a valuation of $7,140,931 for the Syracuse lines.

Propose to Fight New Passenger Rates

Dissatisfied with the through interurban passenger rates as increased by the California State Railroad Commission on the Pacific Electric Railway lines on Jan. 1, 1922, the cities of Pasadena, South Pasadena, Glendale and Alhambra through these cities' attorneys have filed a petition for a writ of review with the State Supreme Court on the ground that the ruling of the State Railroad Commission is unconstitutional. The rates were the result of several drawn-out hearings held since the year 1918 before the State Railroad Commission and vigorously fought by the attorneys, associations and committees from fifty-seven different small towns and cities served by the company's interurban lines.

The decision invokes the constitutional provision that "a through rate shall not be greater than the sum of the intermediate rate," and asks that the high court set aside the ruling of the commission on through fares.

Detailed items of the alleged violation of rate-making principles are set forth in the petition. It is alleged that while the through rate from Los Angeles to Pasadena was fixed by the commission at 29 cents, a passenger may ride to Sierra Vista station for 10 cents and then from Sierra Vista to Pasadena for the same amount, making a total through rate of only 20 cents if the passenger makes the Sierra Vista stop.

The through fare to South Pasadena from Los Angeles, the petition sets forth, was fixed by the commission at 24 cents, but a passenger may ride to Sierra Vista for 10 cents and then to South Pasadena for 6 cents, cutting the through straight fare by 8 cents. Other similar situations exist on the Garvanza Line, and the lines to Glendale and Alhambra.

The city attorneys hope that a speedy decision will be had on the writ. When the commission formerly announced its decision in this matter the cities involved in the present action petitioned for a rehearing, after which, in September, the commission reaffirmed its earlier ruling.

Providence Will Have Lower Fares

The United Electric Railways, Providence, R. I., recently announced a fare reduction to become effective on Jan. 1, 1923. Fares which have been 6 cents will be lowered to 5 cents through the purchase of ten tickets for 50 cents. The tickets will be good in any 6-cent fare zone. Ticket holders will be permitted to purchase transfers for 2 cents as under the present system of cash fares. The cash fare will remain at 6 cents. The company's statement says that operating costs do not warrant a fare reduction, but that it is expected sufficient revenue will be raised through the collection of the 5-cent fares for regular riders and 6-cent fares from occasional riders.

Transportation News Notes

Bus Operation Up to Commissioners.—The question of granting a permit to the Pennsylvania & New Jersey Railway to operate buses between Bristol and Doylestown, Pa., and tear up its tracks will be submitted to the entire Board of Public Service Commissioners at Harrisburg. Commissioner James Benn conducted a preliminary hearing in Philadelphia. Protests were filed by the various municipalities through which the company now operates. They wished to know whether the company would put the road in good condition if the trolley tracks were abandoned.

Trackless Project Before Council.—James F. Hamilton, president of the New York State Railways, has applied to the Common Council of Rochester for permission to operate trackless trolleys or buses through certain streets of the city of Rochester. In his application President Hamilton said that trackless trolleys were feasible and could be installed within a short time. He mentioned the fact that the trolleys could be operated over Driving Park Avenue bridge, which would be a great convenience for those citizens who have to use a circuitous route by electric railway or by foot.

Through Cars Will Be Run.—By an agreement between officials of the Springfield (Mass.) Street Railway and the Holyoke Street Railway, through cars are to be run, beginning Oct. 12, between Holyoke and Westfield, Mass., avoiding changes and waits at the intercity line. In order to effect this change, brought about by an agitation of patrons, it is necessary for the Holyoke Street Railway to make an exception of its established policy which has barred the use of one-man cars on its lines. As one-man cars are run on the Westfield end, the Holyoke company will rig up a sufficient number of one-man cars so that the cars may be run through on this route.

Seeks to Increase "Owl" Fare.—Permission to increase the fare for riding on "owl" cars from 5 to 10 cents has been asked in a petition filed with the Indiana Public Service Commission by the Indianapolis Street Railway. The petition declared the owl service is being provided at a loss of approximately $15,000 a year under the present fare. Owl cars are operated between 12:30 and 5 o'clock in the morning for the convenience of persons working at night and arriving in the city on late trains. Approximately 350 000 passengers are carried by them annually. The proposed increase would meet the deficit of $15,000 incurred in operating the service. The Corporation Counsel of Indianapolis has given notice that the city administration will not oppose the proposed increase.

New Publications

Two Important Books on Heavy Traction

Railway Electric Traction. By F. W. Carter, technical engineer British Thomson-Houston Company, Rugby, England. Longmans, Green & Co. New York, N. Y. 412 pages. Extensively illustrated.

La Traction Electrique aux États-Unis. By Marcel Japiot and A. Ferrand. Reprinted from the *Annales des Mines*, issues from October, 1920, to March, 1921. Published by Durod, Paris.

Mr. Carter's book meets a need for an up-to-date and comprehensive treatise on heavy electric traction. It is by no means a compilation, although replete with data, for it is written out of a wealth of experience and analysis. In spots mathematics is used freely, principally in connection with mechanics, but this permits a great deal to be given in a small space. The formulas can be skipped by those who are more interested in the author's opinions and data than in his mathematical deductions. One refreshing feature of the text throughout is the frank and yet appreciative comment on practices and sources of information.

Mr. Carter is outspoken in favor of direct current for heavy traction. He believes that results have justified his early predictions as to the outcome of the struggle between it and single phase. At the same time he gives some attention to the latter, although without enthusiasm. Regarding frequency and the European comment that 25 cycles as used in America is too high, he states that the lower frequency is better and zero frequency best of all.

"Railway Electric Traction" covers all of the technical phases of the subject, locomotives, motors, control, distribution, power supply, etc. Two excellent chapters are given to the mechanics of train operation. A feature that will prove of great reference value is a table of data for thirty-two locomotives, United States and foreign, with pictures to permit the data to be visualized. The "unattended" substation, as the author terms what is called the "automatic" substation in America, also comes in for a reasonable share of attention.

In conclusion it is only fair to allow the author to say a word for himself regarding his book. Here is, in part, what he says:

"In writing this book the author set himself a twofold task: firstly, to discuss the methods of electric traction, as applied to railways; secondly, to expound methods of technical calculation applicable to the subject. In pursuance of the first objective he propounded to himself, and endeavored to answer the questions: What constitutes good practice, and why?"

The book on Electric Traction in the United States, by Messrs. Japiot and Ferrand, in French, is of great interest on account of the careful manner in which these and other French engineers have of recent years studied the heavy traction development in this country. Mr. Japiot is an engineer of high position with the Paris-Lyons-Mediterranean Railway, while Mr. Ferrand is also an engineer of high standing in this field. They visited the United States in 1919 as part of the committee sent here to study the electrification of railroads, and in this book give the results of their study. They made liberal use of the files of the *Electric Railway Journal* in this connection, giving credit in numerous footnotes scattered throughout the book.

It is unnecessary to go into details of the contents of "Le Traction Electrique" as most of the material is familiar to close readers of this paper. However, it gives the information in convenient form and furnishes what is always interesting, a picture of ourselves as others see us.

The Mechanism of Lubrication

By William Stone, late chief electrical engineer Victorian Government Railways. Published by "Industrial Australian and Mining Standard," Melbourne, Sydney, London. 1922.

In a thirty-six-page pamphlet the author gives the text of a lecture in which, with the aid of diagrams and working models, he explains the theory and practice of lubrication.

Experimental Production of Alloy Steels

By H. W. Gillett and E. L. Mack. Bulletin 199. Bureau of Mines, Government Printing Office, Washington, D. C.

Electric railway engineers who are interested in metallurgy will find much of interest in this publication. Among the alloying metals studied were uranium, manganese, molybdenum, chromium, vanadium, nickel, copper and zirconium.

Maintenance of Lead Storage Batteries

Die Krankheiten des Blei-Akkumulators. —F. E. Kretzschmar. Published by R. Oldenbourg, Munich and Berlin, 1922.

This is the second edition of a convenient reference manual on the operation of lead storage batteries. It is highly practical in character and to railway power men familiar with the German language would be useful if they have any lead batteries within their jurisduction.

Year Book of A.S.T.M.

Year Book of American Society for Testing Materials. Published by the Society, 1315 Spruce Street, Philadelphia, Pa.

This year book, revised to August, 1922, contains the membership directory comprising 3,069 names, the constitution of the society, lists of committee members, regulations governing various activities, information regarding the American Engineering Standards Committee and a list of standards of the A. S. T. M.

Statistical Abstract of the United States

Issued by the Department of Commerce. Obtainable at a nominal price from any district or co-operative office of the Bureau of Foreign and Domestic Commerce, or from the Superintendent of Documents, Government Printing Office, Washington, D. C.

This is a 962-page compilation of information, covering manufactures, imports and exports, wholesale prices of commodities, consumption of commodities, railroads, labor statistics, wages, strikes, industrial action, etc. The cost of compilation has been met by the Department of Commerce, so that the government is only charging the cost for paper, printing and binding in the price set on this volume.

Railroad Shop Practice

By Frank A. Stanley, Consulting Mechanical Engineer. McGraw-Hill Book Company, Inc., New York, N. Y. 331 pages. Well illustrated. Cloth. 6 x 9 in.

The material presented has been adapted largely from articles by the author which appeared in *American Machinist* and other technical journals. Much original matter, with some contributions from other authors, is included. Descriptions are given of tools, equipment and best methods used in steam railroad shops for machining and repairing various locomotives and car equipment parts. Chapters on wheel shop equipment and methods, portable tools and appliances, special tool cutters and toolroom methods, and reclamation work contain much information which will be of assistance to electric railway shop men.

Standard Handbook for Electrical Engineers

Fifth edition. Frank F. Fowle, editor-in-chief. McGraw-Hill Book Company, Inc., New York City. 2,137 pages. Illustrated.

The well-known "Standard Handbook" is gradually expanding in size, although the publishers are endeavoring, by constant revision, to provide for advances in the electrical field without unduly expanding the book. With this edition the total issue reaches 68,000 copies, indicating a widespread use.

The "Standard Handbook" has now been in use practically fifteen years. During this period its general publication policy has been consistently maintained, experts in the many fields of electrical engineering being enlisted to maintain the high character of the text. The present edition is a thorough revision, and a number of new sections have been added. The section on electric railways, by A. H. Armstrong and N. W. Storer, covers 150 pages and is considerably revised from the last edition.

The May, 1922, issue of the *South African Railways and Harbor Magazine* was an electrification number. It contains many articles on the subject of steam railroad electrification by noted authorities, who treat the subject from several points of view. Included is a summary of world progress in railway electrification.

Personal Mention

Three Efficient Leaders

F. E. Connors, Waldo G. Paine and J. F. Gannaway Will Continue to Direct Washington Companies

Certain changes have been made in the staff of the Spokane & Eastern Railway & Power Company and the Inland Empire Railroad, Spokane, Wash. They follow the death of the former president, George H. Taylor, and the resignation of other former officers. The personnel is now as follows: President, M. H. MacLean, Chicago; vice-president, J. W. Esmond, Chicago; vice-president and general manager, F. E. Connors, Spokane; vice-president, traffic manager and treasurer, Waldo G. Paine, Spokane; secretary and auditor, in charge of accounting, freight claims, car service, taxes and right-of-way matters, L. C. Ream, Spokane; assistant secretary and assistant treasurer, Chester Corey, Chicago; claim agent, F. Weidmer, Spokane; superintendent, J. F. Gannaway, Spokane; electrical superintendent, J. W. Hungate, Spokane; mechanical superintendent, A. H. Mayham, Spokane; chief engineer, A. J. Mitchell, Portland.

It is a noteworthy fact that the three men who have been largely responsible for the operation of the traction lines during and after the receivership have been chosen to continue as captains. A better crew would be unnecessary, even if it could be found, than that composed of Mr. Connors, Mr. Paine and Mr. Gannaway.

Mr. Connors, now fifty-three years old, took up his first railway work, when he was sixteen years old, with the Chicago & Alton Railroad. For five years he remained in the Chicago office. His next move was to the Santa Fé Railroad, at Topeka, Kan. Though he was a clerk in the stationary department when he started, he was assistant to the vice-president when he left in January, 1919. As assistant to the vice-president he had charge of purchases, stores, timber and coal properties of the company. Only one more change in railway association figures in the life of Mr. Connors. His resignation from the Santa Fé company on Jan. 9, 1919, was followed by his appointment next day as the receiver of the Spokane & Eastern Railway & Power Company and the Inland Empire Railroad. The surest measure of his success and the greatest tribute to it came in February, 1920, when he was elected vice-president and general manager of both companies.

J. F. GANNAWAY

Centering his attention in the Northwest, Mr. Paine has been intimately connected with the railway development there. He was associated with F. A. Blackwell and others in the building of the old Cœur d'Alene & Spokane Railway, which extended from Spokane, Wash., to Cœur d'Alene, Idaho. This property was afterward combined with the Jay P. Graves properties, which consisted of the Spokane Traction Company—city lines—and the Spokane Terminal Company. Of these lines Mr. Paine was made general passenger agent. Still later they were joined with the Inland Empire Railroad, which extended into the Palouse country, and Mr. Paine was made general freight and passenger agent. It is this growth which Mr. Paine has fostered. In 1910, when the Hill interests purchased the property, Mr. Paine was made vice-president and traffic manager. Recently he was instrumental in furthering the consolidation of the city lines of the Spokane & Eastern Railway & Power Company with those of the Washington Water Power Company. Mr. Paine was elected a director of the Spokane United Railways, which is the successor under the consolidation. He continues as vice-president and traffic manager of the interurban lines, the Spokane & Eastern Railway & Power Company and the Inland Empire Railroad.

W. G. PAINE (LEFT) AND F. E. CONNORS

Since 1918 Mr. Gannaway has been superintendent of these lines. His first position with the company was that of trainmaster, with headquarters at Spokane. This was in 1911. As superintendent of the interurban lines of the two companies which have been evolved, Mr. Gannaway has charge of 168 miles of road electrically operated. The companies handle both freight and passenger service under standard rules. His previous experience Mr. Gannaway gained with the Chicago, Burlington & Quincy Railroad in Iowa and Illinois as telegraph operator for three years; with the Missouri Pacific Railroad, as telegraph operator, and as train dispatcher at Atchison and Concordia, Kan. From 1909 to 1911 he was chief dispatcher for the Spokane, Portland & Seattle Railroad. In 1911 he became connected with the Spokane & Eastern Railway & Power Company and Inland Empire Railroad.

C. L. Cadle Nominated State Engineer

Charles L. Cadle of Rochester, N. Y., well-known in electric railway circles, has been nominated by the Republican party as state engineer and surveyor.

From 1904 to 1906 Mr. Cadle was associated with the Cleveland (Ohio) Railway. He then became manager of the Electric Railway Improvement Company of Cleveland and in 1917 went to the New York State Railways as electrical engineer. Two years later he was appointed chief engineer of the New York & Harlem Railroad. Meanwhile he continued his duties with the New York State Railways in Utica, Syracuse and Rochester. He was an officer of the American Electric Railway Engineering Association and president of Clark, Cadle, Harmon Corporation of Rochester. For two years he has been state superintendent of public works.

Mr. Cadle was born at Mentor, Ohio, March 10, 1879. Completing his academic education, he entered Case School of Applied Science at Cleveland, graduating from that institution in 1904 with the degree of B. S.

Changes in Bay State System

Resignation of Thomas Lees Ends Long Railway Career—M. E. McCormick Is Successor

If "Certain People of Importance" were to be written about the electric railway industry among the L's would be Thomas Lees, past-president of the New England Street Railway Club, and recently resigned manager of the Lowell Division of the Eastern Massachusetts Street Railway. By his achievements is Mr. Lees known even where personal acquaintance has been impossible. Since 1901 he has had the responsibility of making the Lowell Division of the Bay State System run smoothly, look trim, please the public and make money. For twenty-one years he has done all these things, and through the month of October he will remain in an advisory capacity to impart to the new manager, Maurice E. McCormick, formerly of the Salem Division, the peculiarities of the Lowell Division which he has studied for so many years. Mr. Lees in his resignation stated that he wanted more time for his other business matters.

THOMAS LEES

Thirty-four years ago Mr. Lees made an unostentatious entrance into the transportation industry as conductor and driver with the Lowell Horse Railroad. From 1890 to 1892 he was with the Boston & Maine Railroad, then returned to the Lowell & Suburban Railroad, the outgrowth of the merging of the Lowell & Dracut and the Lowell Street Railway Companies. The road had started to electrify its lines. Mr. Lees was in the shops of the company during the electrification.

From 1895 to 1897 he was starter at Lakeview Park, but in 1898 became starter in Lowell. In 1899 Mr. Lees was promoted to be assistant superintendent in Nashua, N. H., and was later made superintendent there.

In 1901 Mr. Lees was brought back to Lowell as local superintendent. He remained in that position until April, 1903, when the Boston & Northern Street Railway was divided into two districts. District 1 was in Lynn, and District 2 was in Lowell. Mr. Lees was appointed district superintendent of the Lowell district, which embraced the cities of Lowell, Lawrence, Haverhill, Woburn and Nashua. When the public trustees were appointed in 1919, Mr. Lees was reappointed to this post.

In 1912 he served as president of the New England Street Railway Club.

Mr. Lees was born in Catrine, Scotland, in 1858, and came to the United States in 1870.

Mr. McCormick, who is to be the new Lowell manager, entered the employ of the company in 1920, coming from Bangor. He was assigned to the management of the Quincy district and a year ago was promoted to be manager of the Salem Division. He has been engaged in street railway work since 1896, starting as an armature winder in the maintenance department of the Bangor (Me.) Street Railway. In 1917 he became manager of the New Brunswick Power Company, St. John, N. B., and remained there until becoming associated with the Eastern Massachusetts Street Railway.

Mr. Nicholson an Auditor of Extended Experience

W. G. Nicholson, who was elected president of the American Electric Railway Accountants' Association at the Chicago convention, was first vice-president of the association last year. Mr. Nicholson has had extended experience in accounting matters on both steam and electric railways. He is secretary and auditor of the Omaha & Council Bluffs Street Railway. Mr. Nicholson has held the position of auditor since Jan. 1, 1910, and secretary since Jan. 19, 1914.

Prior to his connection with the electric railway field Mr. Nicholson was connected with the accounting departments of various steam railroads. He was with the Chicago, Rock Island & Pacific Railway, Chicago, Ill., for a number of years. In 1905 he entered the service of the Cincinnati, Hamilton & Dayton Railway at Cincinnati, Ohio. After a brief connection with that company he resigned to become chief clerk to the secretary and treasurer for the Indiana, Columbus & Eastern Traction Company, which is now included in the system of the Ohio Electric Railway, Cincinnati, Ohio. He went to Omaha in 1910.

Park Named For Dr. Jameson

Dr. Henry Jameson, chairman of the board of directors of the Indianapolis (Ind.) Street Railway, now has a city park in Indianapolis named for him, which proves that public service does not always go unrequited. For years Dr. Jameson was a member of the Indianapolis park board and as such was instrumental in establishing the present public park system. He gave freely of his time and money, and since his retirement from public life has always been a "friend at court" to those who were seeking to put through something which would be of lasting benefit to the city. Ellenberger Woods, named thus after the man who formerly owned the tract, has been rechristened Jameson Park.

C. D. Shellabarger Is Lackawanna's Master Mechanic

The responsible position of caring for the ninety-four cars and three electric locomotives of the Lackawanna & Wyoming Valley Railroad, which operates 50 miles of track in and about Scranton, Pa., has been turned over to C. D. Shellabarger. His title is master mechanic and he is a busy one, for the lines of the company serve the important cities of Wilkes-Barre, Scranton and Pittston as well as other smaller towns. This road, known as The Laurel Line, was one of the first high-speed electric interurbans in the East. It is of almost standard construction and follows the line of steam railroad operation.

Mr. Shellabarger's promotion, effective in July, took him from the position of general shop foreman of the company. This he had held since November, 1921, when he joined the Lackawanna Railroad.

His previous work has had an important bearing on his present success. After graduating from the University of Dayton in 1901 he held the post of rating chief electrician of the United States Navy from 1902 to 1907. For the next year he was armature winder of the Dayton (Ohio) Electrical Manufacturing Company, and from 1908 to 1909 he was machinist with the Joyce Cridland Company at Dayton.

M. E. MCCORMICK

After 1909 he centered his activities in and about New York, during that year acting as electrical foreman for the P. T. Dunn Contracting Company. From 1910 to 1911 he was airbrakeman in the Thirty-ninth Street shops of the Brooklyn Rapid Transit Company, and from 1911 to 1917 he was airbrake foreman for the New York, Westchester & Boston Railroad.

Then came the war and Mr. Shellabarger returned to the navy as chief machinist of the United States Naval Aviation from 1917 to 1920. Thereafter until taking up his work with the Lackawanna railroad, he was with the Interborough Rapid Transit Company in various shops as airbrake inspector.

C. E. Bitzer has been appointed superintendent of the City Railway, Dayton, Ohio. F. Huber formerly held this position.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE
MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Soft Coal Shipments Increase

Although the aggregate shipments of soft coal have increased gradually during September, the shipments from individual producing districts have fluctuated irregularly. A government table showing by districts the average daily shipments for the last three weeks in September and the daily shipments for the first three working days of October indicates that in Pennsylvania there was a slight decrease each week since Sept. 9, and that the week of Oct. 5 was begun with shipments at a lower rate than the previous week. In Maryland and part of northern West Virginia there has been a steady increase, but in southern West Virginia there has been a steady decline. In Kentucky, there has been little or no change up to the present week, for which, however, a decline is indicated. In Alabama, daily shipments have been falling off since the close of the first week of September. In Ohio, Indiana and Illinois, there have been gradual gains up to this week which now appear to be checked. West of the Mississippi shipments have in the main steadily increased. The total of daily shipments of soft coal from producing districts given in net tons, assuming fifty tons to the car, based upon records of cars loaded, as reported by the railroads to the American Railway Association is shown in table above.

District	Average Week Ended Sept. 16	Average Week Ended Sept. 23	Average Week Ended Sept. 30	Monday Oct. 2	Tuesday Oct. 3	Wednesday Oct. 4
Total Pennsylvania	383,767	369,766	346,466	419,750	332,300	326,250
Total West Virginia and Maryland	270,625	264,433	255,959	350,100	254,000	240,100
Total, east of Mississippi River	1,272,926	1,281,548	1,288,410	1,652,200	1,214,950	1,183,150
Total, west of Mississipp. River	192,024	194,683	197,508	249,150	189,300	193,650
Grand total bituminous shipped	1,464,950	1,476,231	1,485,918	1,901,350	1,404,250	1,376,800

Pacific Electric Places New Cars in Service to Hollywood

The fifty new all-steel cars as built by the St. Louis Car Company for the Pacific Electric Railway for improving its local street car service to and from Hollywood have been delivered to the company at the rate of five cars per week, whereby twenty cars have now been received and placed in service. These cars were ordered on the ruling of the California State Railroad Commission when on Jan. 1, 1922, it granted the Pacific Electric an increase in fares to and from Hollywood. These new cars are a decided improvement over the old ones in speed of loading as they have considerable loading space within the cars, enabling them to get under way while fares are being collected.

They have center entrance and exit, as well as end exit. The end door on trail cars can be operated by collectors from the street, making it possible to load passengers during the peak hours through two entrances.

All entrances and exits are closed while cars are in motion to prevent step accidents. The seating capacity of the cars is sixty-five. The length of the cars is 52 ft. 7½ in. The cars have 36-in. aisles. They are equipped with four 50-hp. motors. They are to be operated in single, two and three car trains. One of the complete cars was on exhibit at the Chicago convention.

Important Discovery in Wood Preservation

A new method by which it is claimed wood can be preserved indefinitely against attacks of all kinds of organisms, both land and water, has been discovered recently by Dr. Paul Bartsch of the Smithsonian Institution. Dr. Bartsch's method consists of impregnation with paraffin containing soluble poisons, those used so far in the experiments having consisted of iodide of arsenic and iodide of copper. Arsenic is known to be deadly to animal organisms, while the efficacy of copper salts for the destruction of plant elements is well known. Specimens of wood have been given this new treatment by the Forest Products Laboratory with great success.

It is understood that the investigations at the Forest Products Laboratory have shown that the new treatment will not cost any more, if as much, as present preservative treatments, and that the paraffin penetrates wood more readily than do the preservatives now being used. Furthermore the same equipment heretofore used for first-class impregnation with creosote and other substances can be used for impregnation by the Bartsch method.

It is said that wood treated by Dr. Bartsch's method will retain its poison compounds because they are effectively sealed in and cannot leach out through the action of water or any other agency. Organisms attacking wood so treated will ingest the poison material and thereby commit suicide.

Marine pilings protected in this manner should withstand for a long time attacks from teredos, or marine borers.

G-E Railway Men Meet at Erie

A meeting of G-E apparatus salesmen and railway supply specialists was held at the company's Erie (Pa.) works on Sept. 28 and 29, just before the convention held by the American Electric Railway Association and affiliated bodies at the Municipal pier in Chicago during the week commencing Oct. 2. Approximately seventy-five men were in attendance at forenoon meetings to discuss various engineering and sales problems. A trip through the Erie factory, the central manufacturing and shipping point for all G-E electric railway apparatus, and also an inspection of a gas-electric locomotive in operation there were features of the two days' programme.

At a dinner at the Erie Club on Thursday evening W. B. Potter was the principal speaker, his subject being "Railway Electrification in Europe." Mr. Potter recently returned from a trip abroad to observe European practices and tendencies in electric railroading there.

Fuel Conversion and Power Making to Be Treated at Exposition

The National Exposition of Power and Mechanical Engineering will serve as the rallying place for all designing and operating engineers and manufacturing executives who are faced today as probably never before by the problems of fuel combustion and power generation and utilization. The exposition will open at the Grand Central Palace, New York City, on Dec. 7 and will extend through to Dec. 13.

The list of those who have reserved space proves conclusively that all phases of the problems of fuel conversion and power making and use will be given complete treatment. Each of the exhibitors is endeavoring to display the possibilities of his products for greater economies. Such an exposition will give a remarkable opportunity for interested engineers and executives to gain a great deal of information in a very short time, as the wares of the various exhibitors in similar lines may be compared and personal contact established with the supplying organizations that should be greatly helpful in the present day struggle for lowered costs.

Metal, Coal and Material Prices

Metals—New York	Oct. 10, 1922
Copper, electrolytic, cents per lb.	13.975
Copper wire base, cents per lb.	15.625
Lead, cents per lb.	6.50
Zinc, cents per lb.	6 975
Tin, Straits, cents per lb.	32.75
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$7 25
Somerset mine run, Boston, net tons	4.30
Pittsburgh mine run, Pittsburgh, net tons	3.625
Franklin, Ill., screenings, Chicago, net tons	3 25
Central, Ill., screenings, Chicago, net tons	2 875
Kansas screenings, Kansas City, net tons	2.60
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	6.50
Weatherproof wire base, N.Y., cents per lb.	16 00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N.Y., cents per gal.	90.50
White lead, (100-lb. keg), N.Y., cents per lb.	11.625
Turpentine, (bbl. lots), N.Y., per gal.	$1 39

Increasing Rolling Stock for New Haven

The New York, New Haven & Hartford Railroad has recently placed an order with the Westinghouse Electric & Manufacturing Company for five 181-ton electric locomotives. The new locomotives will practically duplicate the ones which are now proving so successful in high-speed passenger service, being equipped for operation on either alternating or direct current.

Rolling Stock

Topeka (Kan.) Railway plans to purchase ten new one-man Birney cars.

Indiana, Columbus & Eastern Traction Company, Cincinnati, Ohio, under the plan to operate three limited trains daily between Zanesville and Dayton, will make additional limited trains into chair cars.

New York, N. Y.—The cars and equipment for use on the proposed trackless trolley lines on Staten Island are to cost $3,000,000, according to Commissioner Whalen's estimates. The plan for trackless trolleys on Staten Island was recently submitted by the Commissioner of Plant and Structures to Mayor Hylan of New York.

Cincinnati (Ohio) Traction Company is converting its non-prepayment type cars, which number about 250, into prepayment type cars by inclosing the rear platform and installing manually folding doors. The company also is eliminating all monitor deck destinations signs and placing them in the front vestibule of each car. All cars are being equipped with illuminated dash route number signs which correspond with the routes on the transfers.

Track and Roadway

Grimsby, Ont.—The Council has passed a resolution indorsing the construction of the proposed hydroradial from Port Credit to St. Catharines.

Wichita Falls (Tex.) Traction Company is building an extension of its lines to the new high school building recently erected. The extension will involve an expenditure of about $75,000.

Knoxville Power & Light Company, Knoxville, Tenn., has been granted the right of way on Walnut Street, which is a definite step toward the construction of a track extension on Walnut between Clinch and Union Avenues.

Rome Railway & Light Company, Rome, Ga., is improving its trackage on Cases Spring Road. Work which is being done will leave only a short stretch of car line not in the center of the road.

Toronto (Can.) Transportation Commission is reported ready to start the construction of the loop at Don Cliff and Glen Echo roads in North Toronto. The Ontario Railway Board has given final approval to the plans of the commission and the Hydro-Electric Power Commission of Ontario for the loop houses and tracks for the radials.

Philadelphia, Pa. — The Frankford Elevated line and the Market Street subway-elevated have been joined. The laying of the tracks is now completed with the exception of a short gap in the third rail. The contract calls for opening the elevated on Nov. 5. The Philadelphia Rapid Transit Company will take possession of the structure on Oct. 25.

Power Houses, Shops and Buildings

United Electric Railways, Providence, R. I., is preparing plans for a large extension to its carhouse at Olneyville.

Underground Railway, London, England, is planning to enlarge its station at Piccadilly Circus to relieve congestion. Negotiations are proceeding looking toward this extension.

Interstate Public Service Company, Indianapolis, Ind., suffered a loss of $10,000 recently when a large transformer at the plant at Columbus blew out. A short circuit is said to have caused the explosion.

New York, N. Y.—The Transit Commission will receive bids on Oct. 20 for construction of foundation and a supply and erection of steel superstructure of new shop and administration building at the Interborough Rapid Transit Company's yards north of 147th Street, New York, N. Y. The total cost of the addition, which is the result of a purchase of 350 new cars, will be more than $1,000,000.

Boston (Mass.) Elevated Railway is rapidly completing the new inspection shop at Hyde Park Avenue, Forest Hills, Boston. The contractors are MacDonald & Imhoff Company of Boston. The new building is of brick, steel and reinforced concrete construction, absolutely fireproof, being one-story high 500x50 ft. The trustees of the railroad company are taking bids on the installation of a dry and wet pipe automatic sprinkler system of approximately 650 heads for the building. The shop will be fitted out with the latest type of machinery and tools.

Electric Express Company, Dallas, Tex., will soon erect a large express depot and warehouse on the block bounded by Market, Young, Jefferson and Wood Streets, site of the recently burned Farmers' Alliance warehouse, according to Burr Martin, general manager of the Texas Electric Railway. The Electric Express Company already owns the site and has a small express depot there now. The present quarters are too small for the company's business. Work is expected to start at once, it is announced, and the depot will be ready for occupancy soon after the Dallas-Terrell Interurban line is put into service, which is expected to be right after Dec. 1. It is expected that the new depot will cost approximately $500,000.

Trade Notes

Gold Car Heating & Lighting Company, Brooklyn, N. Y., announces the death of Allen Sheldon, one of its Chicago representatives.

Bridgeport (Conn.) Brass Company announces the opening of a Detroit office in the General Motors Building, with Frank H. Longyear as district manager.

The J. G. Brill Company, Philadelphia, Pa., has issued a letter, the purpose of which is to place before interurban railway officials the high-speed lightweight interurban car recently developed by the company's Kuhlman plant for the Western Ohio Railway. Inside the letter the illustration and details of construction and equipment are given.

The Hardwood Manufacturers' Institute, Chicago, Ill., has started the issuing of a monthly news bulletin. The first number, dated Sept. 30, urges all members of the institute to read the bulletin carefully and to offer suggestions for the future members. All activities of the Hardwood Manufacturers' Institute will be given in these bulletins.

American Brake Shoe & Foundry Company, New York, N. Y., through its directors approved a plan for forming a subsidiary company, to be known as the Ramapo Ajax Corporation, to take over property of the Ramapo Iron Works plants at Hillburn, N. Y.; Niagara Falls, N. Y., and Niagara Falls, Ont., and the Ajax Forge Company, with plants at Chicago and Superior, Wis. The plans call for the sale of $2,500,000 first mortgage twenty-year 6½ per cent bonds, which already have been underwritten.

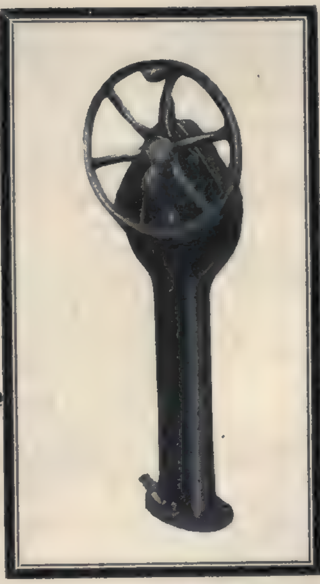
New Advertising Literature

Century Wood Preserving Company, Pittsburgh, Pa., has issued a twenty-three page bulletin (No. 24) entitled "Treated Ties and Timbers for Industrial Plants." The booklet is well illustrated and gives some valuable information on wood preservation, processes used in timber treatment, etc.

The Hardwood Manufacturers' Institute, Chicago, Ill., has issued a booklet entitled "Waste Elimination in the Production and Consumption of Hardwood Lumber" which describes and illustrates different simple methods of avoiding waste in hardwoods. It is believed that by the use of grade rules 2,000,000 ft. a day can be saved.

General Electric Company, Schenectady, N. Y., has issued Bulletin 46108 describing the Type M-4 demand meter which is manufactured by it and designed for use in combination with a watthour meter to indicate maximum demand. It is of the so-called "block interval" type indicating the maximum demand integrated and averaged over a definite time interval.

Peacock Staffless Brakes



Braking Power

At least three times as powerful as any ordinary type hand brake, the motorman's effort is most rapidly and effectively converted into braking power.

Chain-winding Capacity

Ample space to wind up all the chain without jamming or binding. An excess of slack cannot put this brake out of commission.

Platform Space

Designed to occupy minimum platform space. It projects only six inches into the vestibule from the dash. This feature is especially valuable in view of the narrow entrance and exit facilities of the safety car.

Simplicity of Operation

Motormen like the Peacock Staffless—it is easy to understand, simple to operate and always dependable.

Lowest Maintenance

Repair bills are practically nil. The Peacock Staffless Brake is so simple and so rugged that there is little or nothing needed to keep it in repair.

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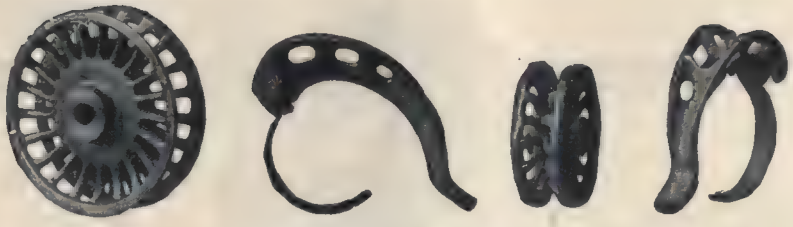

In Time Of Peace Prepare For War

In fine weather prepare for storms.

In the fall season—NOW—prepare for the winter sleet storms.

Nothing is more helpless than a trolley car in a sleet storm unless equipped with sleet cutters or scrapers.

Nuttall has every known practical sleet removing device—big 6-in. cutter wheels and scrapers for interurbans—4-in. cutters and scrapers for city service. And you could buy a barrel of them for less than it costs to tie up traffic ten minutes.

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

R.D. NUTTALL COMPANY
PITTSBURGH AGMA PENNSYLVANIA

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Nuttall

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The Jas. H. Crosett Co. ENGINEERS
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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

COLUMBIA
Trolley Equipment

WHEELS

Roads using Columbia Trolley Wheels report unusually good mileage records. We expect this because we have chosen the best possible alloy of pure metals, after exhaustive experiments and tests. This alloy combines ample conductivity with proper hardness for minimum wear of wheel and wire. Bound Brook Oilless Bushings are used.

POLES

Our policy is to design for minimum weight, but with ample strength where strength is needed. Columbia Poles are reinforced inside at the lower end where bending strains are greatest. They are made in butt-weld and seamless styles—in lengths from 11 ft. to 16 ft.

HARPS

Unsurpassed for perfect conductivity and long wear. They are sold separately or equipped with wheels and axles ready for installation

Write to us for Circulars

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E. Keller, Brooklyn, N. Y.
F. C. Hedley, Brooklyn, N. Y.
J. L. Whittaker, 141 Milk St., Boston, Mass.
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First!

—first to brand Butt-Treated poles for the protection of the buyer.

—first to use a butt-treating process that insures a deeper penetration of the preservative throughout the ground-line area.

—first to give a written guarantee specifying a definite depth of penetration.

The "P & H" Guaranteed Penetration Process

is the original and strongest Guaranteed Penetration Process of butt-treatment. We agree to refund, without quibbling, the entire butt-treating price on every pole that does not show the specified half inch uniform penetration.

For longest pole life---for greatest satisfaction and economy---insist on the "P & H"--- the original Guaranteed Penetration Process.

We produce and sell butt-treated and untreated Northern White and Western Red Cedar Poles; --- we can give you any form of butt-treatment; --- and we are the originators of the Guaranteed Penetration Process---the "P & H".

Prompt Shipment - yards conveniently located throughout the North Central and Western States.

Get the facts about Butt-Treatment
Write for illustrated booklet.

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The tax on snapped axles, broken steering arms and crystallized frames;

The tax paid on unabsorbed road shocks that hammer a motor bus to premature destruction;

Every repair bill you pay is an installment of your "Shock Tax."

Another installment of "Shock Tax" goes for extra fuel. The energy consumed in rocking and jouncing a heavily laden bus comes only from one source, the gasoline tank.

MITTEN-TRAYLOR MOTOR BUSES are "Shock Tax" free.

HIFLEX SPRING SUSPENSION (not merely a "Shock Absorber") built into Mitten-Traylor Buses insulate them against the damage of road compact.

MITTEN-TRAYLOR BUSES *ride easier, last longer* and *cost less* to operate—HIFLEX does it!

Write for details of the latest spring developments.

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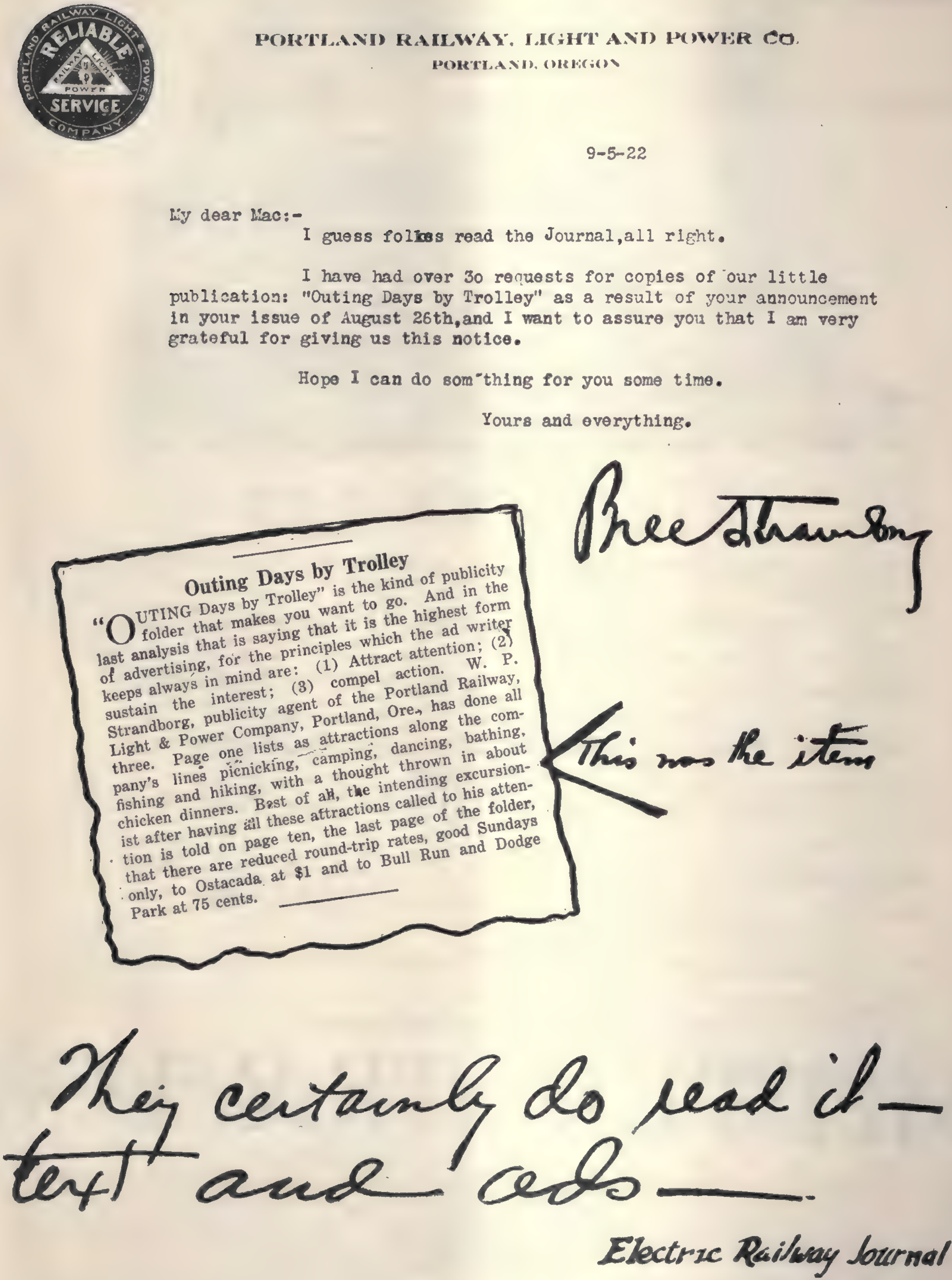

PORTLAND RAILWAY, LIGHT AND POWER CO.
PORTLAND, OREGON

9-5-22

My dear Mac:-

I guess folks read the Journal,all right.

I have had over 3o requests for copies of our little publication: "Outing Days by Trolley" as a result of your announcement in your issue of August 26th,and I want to assure you that I am very grateful for giving us this notice.

Hope I can do som'thing for you some time.

Yours and everything.

Pree Strandborg

Outing Days by Trolley

"OUTING Days by Trolley" is the kind of publicity folder that makes you want to go. And in the last analysis that is saying that it is the highest form of advertising, for the principles which the ad writer keeps always in mind are: (1) Attract attention; (2) sustain the interest; (3) compel action. W. P. Strandborg, publicity agent of the Portland Railway, Light & Power Company, Portland, Ore., has done all three. Page one lists as attractions along the company's lines picnicking, camping, dancing, bathing, fishing and hiking, with a thought thrown in about chicken dinners. Best of all, the intending excursionist after having all these attractions called to his attention is told on page ten, the last page of the folder, that there are reduced round-trip rates, good Sundays only, to Ostacada at $1 and to Bull Run and Dodge Park at 75 cents.

This was the item

They certainly do read it—
text and ads—

Electric Railway Journal

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege if not the practice of all modern manufacturers."—*Vauclain.*

Bulletin No. 6

DEMONSTRABLE VALUES

Many of the advantages possessed by Standard Steel Works products can be demonstrated through chemical, physical or service tests and comparisons.

Other advantages, however, can only be weighed through business judgment.

May we send you details as to our suggested method for a full comparison upon all counts?

Steel Tires

Steel Tired Wheels

Solid Forged and Wrought Steel Wheels

Rolled Steel Gear Blanks

Steel Axles

Steel Springs

Steel Forgings

Steel and Malleable Iron Castings

Rolled Steel Rings

Steel Crusher-Rolls and Shells

Steel Pipe Flanges

STANDARD STEEL WORKS COMPANY

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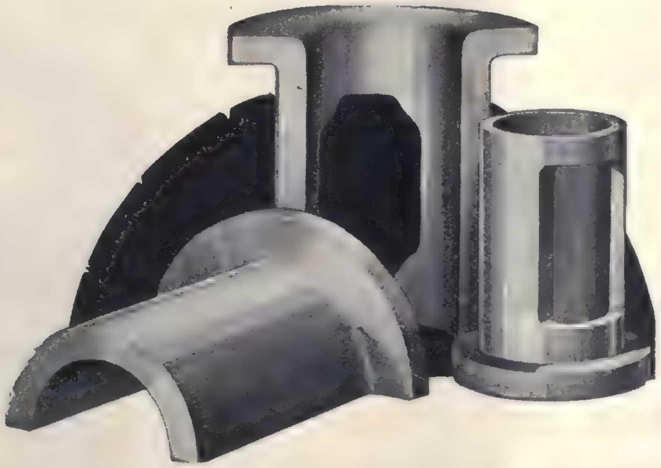
WORKS: BURNHAM, PA.

"TIGER" BRONZE



"TIGER" BRONZE has a very slow and even rate of wear, which results in correct alignment and far greater mileage.

MORE-JONES BRASS & METAL CO.
St. Louis, Mo.

TROLLEY WHEELS: V-K *Oil-less*, M-J *Lubricated*
HARPS: V-K *Non-Arcing*

BEARINGS: *"Tiger" Bronze Axle and Armature*

ARMATURE BABBITT *and Similar Products*

MORE-JONES QUALITY PRODUCTS

492,750 miles

May 3, 1913
to
April 10, 1922

In that steady grind of ***City Railway*** service

"Tool Steel"

And the user writes:

"We have several other pinions yet in service and in good condition which will probably give service almost equal to the one we have just taken out."

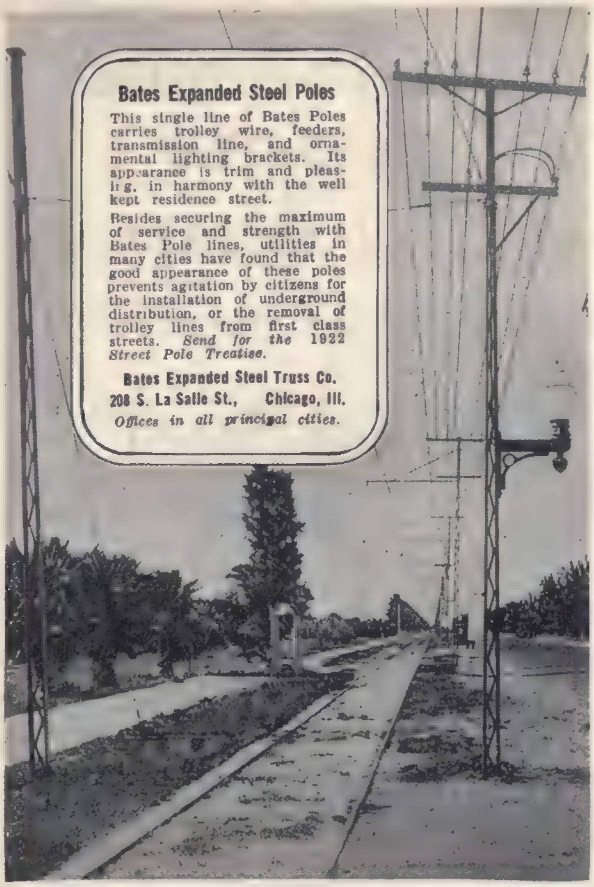
"Tool Steel" Quality **T. S. Q.** "Tool Steel" Quality

Advertising Is the Sunlight of Business

To all that is healthy and vital in business, it means increased strength and growth; but advertising is a fierce heat which withers and consumes that which is unsound.

A business which is not a good business should not be advertised. A business which would not benefit from widespread appreciation of its ideals had better acquire a new set of ideals.

[Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies]



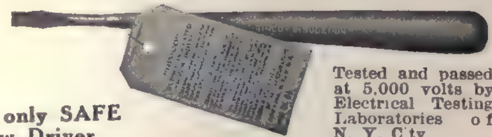
Bates Expanded Steel Poles

This single line of Bates Poles carries trolley wire, feeders, transmission line, and ornamental lighting brackets. Its appearance is trim and pleasing, in harmony with the well kept residence street.

Besides securing the maximum of service and strength with Bates Pole lines, utilities in many cities have found that the good appearance of these poles prevents agitation by citizens for the installation of underground distribution, or the removal of trolley lines from first class streets. *Send for the 1922 Street Pole Treatise.*

Bates Expanded Steel Truss Co.
208 S. La Salle St., Chicago, Ill.
Offices in all principal cities.

"RIMCO" Insulated Screw Driver



The only SAFE Screw Driver for linemen and all high tension work

7½", 8½", 10½"

Tested and passed at 5,000 volts by Electrical Testing Laboratories of N. Y. City.

Semi-soft rubber insulation bonded to metal by Elchemco process. Insulation cannot crack or work loose.

RUBBER TRADE RIMCO MARK PRODUCTS REG. U.S. PAT. OFF.

Rubber Insulated Metals Corporation
50 Church Street, New York City, U. S. A.
Distributed by The Electric Service Supplies Co., and other distributors
Export Distributor. International Western Electric Co.

AMERICAN ELECTRICAL WORKS. AMELECTRIC. Wires and Cables PHILLIPSDALE, R.I.

Reg. U. S. Pat. Office

Galvanized Iron and Steel Wire and Strand

Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

WEATHERPROOF WIRE AND CABLE

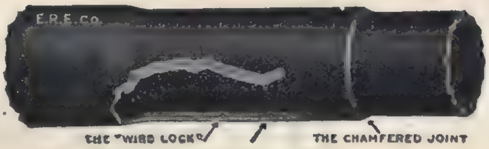
PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 233 B'way.

ELRECO TUBULAR POLES



COMBINE

Lowest Cost **Lightest Weight**
Least Maintenance **Greatest Adaptability**

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

International Creosoting & Construction Co.
Galveston, Texas

Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.

NASHVILLE TIE COMPANY

Cross Ties: White Oak, Chestnut, and Treated Ties. Oak Switch Ties.

Prompt shipment from our own stocks.

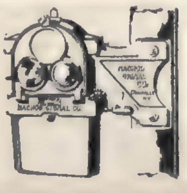
Headquarters—Nashville, Tenn.

A. D. Andrews, Terre Haute, Ind., Representative.

AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KY.



U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

U. S. Electric Contact Signals for

Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work

United States Electric Signal Co.
West Newton, Mass.

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

SPECIAL TRACKWORK
Of the well-known **WHARTON** Superior Designs
and Constructions

Steel Castings Converter and Electric
Forgings Drop Hammer and Press
Gas Cylinders Seamless Steel

Wm. Wharton Jr. & Co. Inc., Easton, Pa.
(Subsidiary of Taylor-Wharton Iron & Steel Co.,
High Bridge, N. J.)

ORIGINATORS OF
MANGANESE STEEL TRACKWORK

Corrugated Culverts
"ACME" (Nestable) and IMPERIAL Riveted Corrugated Culverts.
Made of anti-corrosive Toncan Metal. Write for prices.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

AETNA INSULATION LINE MATERIAL
Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches
Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way.
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, E. C. 4, 38-39 Upper Thames St.

ANACONDA TROLLEY WIRE
ANACONDA COPPER
MINING COMPANY
Rolling Mills Department
CHICAGO, ILL.

ANACONDA
from mine to consumer

THE AMERICAN
BRASS COMPANY
General Offices
WATERBURY, CONN.

Ramapo Iron Works
Established 1881

Ajax Forge Company
Established 1883

RAMAPO AJAX CORPORATION
Successor
HILLBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Automatic Return Switch Stands for Passing Sidings
Automatic Safety Switch Stands
Manganese Construction—Tee Rail Special Work

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
TRIPLEX

Arc Weld and Flame Weld

Send for new
Rail Bond book

American Steel & Wire Company
CHICAGO
NEW YORK

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

Chapman
Automatic Signals
Charles N. Wood Co., Boston

THE INDIANAPOLIS SWITCH & FROG CO., SPRINGFIELD, OHIO

Indianapolis Economy Products That Make Dollars "Grow"

Indianapolis Solid Manganese:
Frogs, Crossings, Mates and Tongue-switches. Super-quality material. Par-excellent designs. Gives many lives to one, of ordinary construction, and when worn down, CAN BE RESTORED by INDIANAPOLIS WELDING.

Indianapolis Electric Welder:
Efficient, Rapid, ECONOMICAL, Durable. Price, $2.00 (per day for three hundred days) thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

Indianapolis Welding Steel:
Fluxated heat treated Metal Electrodes, insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untreated.

Indianapolis Welding Plates:
Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and COUNTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

Indianapolis Welding Supplies:
CABLES, HELMETS, LENSES, CARBONS.

Turntables:
Ball-bearing, for ash-pits, storage yards, etc.

Indianapolis "Economy" Products
are Pre-eminently "Money Savers," YES—"Money Makers" for Electric Railways.

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

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PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
FORT WORTH, TEX., Flatiron Building
HONOLULU, H. T., Castle & Cooke Building

THE BABCOCK & WILCOX COMPANY
STEAM

WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES
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NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

Series Type

Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO RAIL BONDS

WILLIAMS' "VULCAN"
FORGED-CUTTER TOOL HOLDERS

For continuous heavy cuts at high speed on lathe, planer, shaper, etc. Change the cutter, *not* the tool, and get all the advantages of the solid bar without its expense. Literature?

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"The Drop-Forging People"

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BUFFALO 57 Vulcan St.
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FOSTER SUPERHEATERS

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

POWER SPECIALTY COMPANY, 111 BROADWAY, NEW YORK

Boston Philadelphia Pittsburgh Kansas City Dallas Chicago San Francisco London, Eng

STERLING VARNISH

Manufactured by electrical engineers who will understand your insulating problems and render intelligent service. Noted for uniformity and quality. It will pay you to get in touch with

The Sterling Varnish Co., Pittsburgh, Penna.

THE CUTTER ELECTRICAL AND MANUFACTURING CO.
CIRCUIT BREAKERS
I-T-E
PHILADELPHIA

I. T. E.
Circuit Breakers

for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

RAILWAY MOTOR BRUSHES

N C C
COLUMBIA
402

Grade 402 has been proved by test the most economical and satisfactory brush for standard slotted commutator railway motors in both city and interurban service. One of a series of standard railway motor brushes.

COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

THE WORLD'S STANDARD
"IRVINGTON"
Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.
Sales Representatives in the Principal Cities

SUPER-SEASONED FIBRE

Peerless Insulation Paper has 25 to 50 per cent higher electrical resistance.

S-S
TRADE MARK

Hornflex Insulation Paper has no grain. Folds without cracking.

NATIONAL [illegible] INSULATION CO
Box 423, Wilmington, Delaware

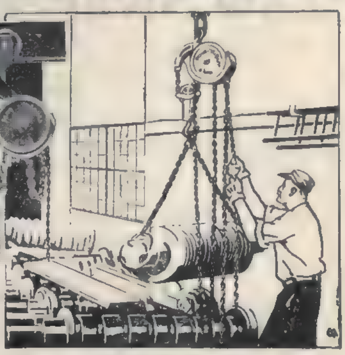
HACKSAW
HIGH SPEED
GLADIUM
ECONOMY
EFFICIENCY
BLADES
GLADIUM CO. Inc. 34 Cliff St. New York

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

FLOOD CITY
Rail Bonds and Trolley Line Specialties
Flood City Mfg. Co., Johnstown, Pa.

FORD TRIBLOC



Where 1 lb.
Produces 50

On the 3-Ton Tribloc illustrated, one man exerting a normal 80 lb. pull lifts 4000 lbs. The planetary gear system of a Tribloc transmits into lifting energy 80% of the power applied, and here multiplies the initial effort 50 times. Workmen welcome an apparatus that wastes so little of their efforts; and employers appreciate the labor costs saved.

Write for information on any type or capacity to 40 Tons.

FORD CHAIN BLOCK CO.
2ND & DIAMOND STREETS PHILADELPHIA, PA.
OVER-SEAS REPRESENTATIVE
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
51 CHAMBERS ST. NEW YORK, U.S.A.
PARIS BRUSSELS TURIN BARCELONA RIO DE JANEIRO

FORD·TRIBLOC
2222-D

TULC
A
LUBRICANT

We make a specialty of
ELECTIC RAILWAY
LUBRICATION
We solicit a test of TULC
on your equipment.

The Universal Lubricating Co.
Cleveland, Ohio

A Single Segment or a Complete Commutator
is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

BUCKEYE JACKS
high-grade R. R. Track and Car Jacks.
The Buckeye Jack Mfg. Co.
Alliance. Ohio

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
- Collier, Inc., Barron G.

Air Receivers & Aftercoolers
- Ingersoll-Rand Co.

Anchors, Guy
- Electric Service Sup. Co.
- Ohio Brass Co.
- Standard Steel Works Co.
- Westinghouse E. & M. Co.

Armature Shop Tools
- Elec. Service Supplies Co.

Automatic Return Switch Stands
- Ramapo Ajax Corp.

Automatic Safety Switch Stands
- Ramapo Ajax Corp.

Axles
- Bemis Car Truck Co.
- Cambria Steel Co.
- Midvale Steel & Ord. Co.
- Standard Steel Works

Axles, Car Wheel
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Westinghouse E. & M. Co.

Axle Straighteners
- Columbia M. W. & M. I. Co.

Babbitt Metal
- Ajax Metal Co.
- More-Jones Br. & Metal Co.

Babbitting Devices
- Columbia M. W. & M. I. Co.

Badges and Buttons
- Electric Service Sup. Co.
- Internat'l Register Co., The

Batteries, Dry
- National Carbon Co.

Bearings and Bearing Metals
- Ajax Metal Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Gilbert & Sons, B. F. A.
- More-Jones Br. & Metal Co.
- Westinghouse E. & M. Co.

Bearings, Center and Roller Side
- Stucki Co., A.

Bearings, Roller
- Stafford Roller Bearing Car Truck Corp'n.

Bells and Gongs
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Consolidated Car-Heating Co.
- Electric Service Sup. Co.

Benders, Rail
- Railway Track-work Co.

Boilers
- Babcock & Wilcox Co.

Boiler Tubes
- Cambria Steel Co.
- Midvale Steel & Ordnance Co.

Bonding Apparatus
- American Steel & Wire Co.
- Electric Railway Improvement Co.
- Electric Service Sup. Co.
- Indianapolis Switch & Frog Co.
- Ohio Brass Co.
- Rail Welding & Bonding Co.
- Railway Track-work Co.

Bonds, Rail
- American Steel & Wire Co.
- Electric Railway Improvement Co.
- Electric Service Sup. Co.
- General Electric Co.
- Indianapolis Switch & Frog Co.
- Ohio Brass Co.
- Rail Welding & Bonding Co.
- Westinghouse E. & M. Co.

Book Publishers
- McGraw-Hill Book Co., Inc.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
- Bates Exp. Steel & Tr. Co.
- Electric Ry. Equip. Co.
- Electric Service Sup. Co.
- Hubbard & Co.
- Ohio Brass Co.

Brake Adjusters
- National Ry. Appliance Co.
- Westinghouse Tr. Br. Co.

Brake Shoes
- Amer. Br. Shoe & Fdry. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.

Brakes, Brake Systems and Brake Parts
- Allis-Chalmers Mfg. Co.
- Bemis Car Truck Co.
- Brill Co., The J. G
- Columbia M. W. & M. I. Co.
- General Electric Co.
- National Brake Co.
- Safety Car Devices Co.
- Westinghouse Tr. Br. Co.

Brooms, Track, Steel or Rattan
- Amer. Rattan & Reed Mfg. Co.

Brushes, Carbon
- General Electric Co.
- Jeandron W. J.
- Le Carbone Co.
- Naional Carbon Co.
- Westinghouse E. & M. Co.

Brushes, Graphite
- National Carbon Co.

Brushes, Wire Pneumatic
- Ingersoll-Rand Co.

Brush Holders
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.

Buses, Motor
- Brill Co., The J. G.
- Mitten-Traylor Incorporated
- Republic Truck Sales Corp.

Bus Seats
- Hale & Kilburn Corp.

Bushings
- Nat'l Fibre & Insulation Co.

Bushings, Case Hardened and Manganese
- Bemis Car Truck Co.
- Brill Co., The J. G.

Cables (See Wires and Cables)

Cambric, Tapes, Yellow & Black Varnished
- Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes Carbon)

Car Lighting Fixtures
- Elec. Service Supplies

Car Panel Safety Switches
- Consolidated Car-Heating Co.
- Westinghouse E. & M. Co.

Cars, Dump
- Differential Steel Car Co.

Cars Passenger, Freight Express, Etc.
- Amer. Car Co.
- Brill Co., The J. G.
- Cambria Steel Co.
- Kuhlman Car Co., G. C.
- McGuire Cummings Mfg. Co.
- Midvale Steel & Ordnance Co.
- National Ry. Appliance Co.
- Wason Mfg. Co.

Cars, Second Hand
- Electric Equipment Co.

Cars, Self-Propelled
- General Electric Co.

Castings, Brass, Composition or Copper
- Ajax Metal Co.
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- More-Jones Br. & Metal Co.

Castings, Gray Iron and Steel
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Standard Steel Works Co.

Castings, Malleable and Brass
- Amer. Brake Shoe & Fdry. Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.

Catchers and Retrievers, Trolley
- Electric Service Sup. Co.
- Ohio Brass Co.
- Wood Co., Chas. N.

Catenary Construction
- Archbold-Brady Co.

Circuit Breakers
- Cutter Co.
- General Electric Co.
- Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
- Anderson Mfg. Co. A. & J. M.
- Electric Ry. Equip. Co.
- Electric Service Sup. Co.
- General Electric Co.
- Hubbard & Co.
- Ohio Brass Co.
- Westinghouse E. & M. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
- Brill Co., The J. G.
- Ohio Brass Co.

Clusters and Sockets
- General Elcetric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
- Columbia M. W. & M. I. Co.
- Electric Service Sup. Co.

Coils, Armature and Field
- Columbia M. W. & M. I. Co.
- Economy Elec. Devices Co.
- General Electric Co.

Coils, Choke and Kicking
- General Electric Co.
- Westinghouse E. & M. Co.

Coin-Counting Machines
- Electic Service Sup. Co.
- Internat'l Register Co., The
- Johnson Fare Box Co.

Commutator Slotters
- Electric Service Sup. Co.
- General Electric Co.
- Westinghouse E. & M. Co.

Commutator Truing Devices
- General Electric Co.

Commutators or Parts
- Cameron Elec'l Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Westinghouse E. & M. Co.

Compressors, Air
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Ingersoll-Rand Co.
- Westinghouse Tr. Br. Co.

Compressors, Air, Portable
- Ingersoll-Rand Co.

Concrete Reinforcing Bars
- Cambria Steel Co.
- Midvale Steel & Ordnance Co.

Condensers
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Ingersoll-Rand Co.
- Westinghouse E. & M. Co.

Condensor Papers
- Irvington Varnish & Ins. Co.

Connectors Solderless
- Westinghouse E. & M. Co.

Connectors, Trailer Car
- Consolidated Car-Heating Co.
- Electric Service Sup. Co.
- Ohio Brass Co.

Controllers or Parts
- Allis-Chalmers Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Westinghouse E. & M. Co.

Controller Regulators
- Electric Service Sup. Co.

Controlling Systems
- General Electric Co.
- Westinghouse E. & M. Co.

Converters, Rotary
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Westinghouse E. & M. Co.

Conveying and Hoisting Machinery
- Columbia M. W. & M. I. Co.

Copper Wire
- Anaconda Copper Min, Co.

Cord Adjusters
- Nat'l Fibre & Insulation Co.

Cord, Bell, Trolley Register, etc.
- Brill Co., The J. G.
- Electric Service Sup. Co.
- Internat'l Register Co., The
- Roebling's Sons Co., J. A.
- Samson Cordage Works

Cord Connectors and Couplers
- Electric Service Sup. Co.
- Samson Cordage Works
- Wood Co., Chas. N.

Couplers, Car
- Brill Co., The J. G.
- Ohio Brass Co.
- Westinghouse Tr. Br. Co.

Cranes
- Allis-Chalmers Mfg. Co.

Cross Arms (See Brackets)

Crossings
- Ramapo Ajax Corp.

Crossing Foundations
- International Steel Tie Co.

Crossing Frog & Switch
- Ramapo Ajax Corp.

Crossing Manganese
- Indianapolis Switch & Frog Co.
- Ramapo Ajax Corp.

Crossing Signals (See Signals, Crossing)

Crossings, Frog & Switch
- Wharton, Jr., & Co., Wm.

Crossings Track (See Track, Special Work)

Crossings, Trolley
- Ohio Brass Co.

Crushers, Rock
- Allis-Chalmers Mfg. Co.

Culverts
- Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
- Brill Co., The J. G.
- Electric Service Sup. Co.
- Morton Mfg. Co.

Dealers' Machinery
- Electric Equipment Co.

Derailing Devices (See Track Work)

Derailing Switches
- Ramapo Ajax Corp.

Destination Signs
- Columbia M. W. & M. I. Co.
- Eectric Service Sup. Co.

Detective Service
- Wish Service, P. Edward

Dogs, Lathe
- Williams & Co., J. H.

Door Operating Devices
- Con. Car-Heating Co.
- Nat'l Pneumatic Co., Inc.
- Safety Car Co.

Doors and Door Fixtures
- Brill Co., The J. G.
- General Electric Co.

Doors, Folding Vestibule
- Nat'l Pneumatic Co., Inc.

Draft Rigging (See Couplers)

Drills, Rock
- Ingersoll-Rand Co.

Drills, Track
- American Steel & Wire Co
- Electric Service Sup. Co.
- Ingersoll-Rand Co.
- Ohio Brass Co.

Dryers, Sand
- Electric Service Sup. Co.

Ears
- Ohio Brass Co.

Electrical Wires and Cables
- Amer. Electrical Works
- American Steel & Wire Co
- Roebling's Sons Co., J. A

Electric Grinders
- Railway Track-work Co.

Electrodes, Carbon
- Indianapolis Switch & Frog Co.
- Railway Track-Work Co

Electrodes, Steel
- Indianapolis Switch & Frog Co.
- Railway Track-Work Co.

Engineers, Consulting, Contracting and Operating
- Allison & Co., J. R.
- Archbold-Brady Co.
- Arnold Co., The
- Beeler, John
- Crosett Co. Jas. H.
- Day & Zimmermann
- Feustel, Robert M.
- Ford, Bacon & Davis
- Hemphill & Wells
- Holst, Englehardt W.
- Jackson, Walter
- Parsons, Klapp, Brinkerhoff & Douglas
- Richey, Albert S.
- Robinson & Co., Inc., Dwight P.
- Sanderson & Porter
- Smith & Co. C. E.
- Stone & Webster
- White Engineering Corp., The J. G.
- Witt, Peter

Engines, Gas, Oil or Steam
- Allis-Chalmers Mfg. Co.
- Ingersoll-Rand Co.
- Westinghouse E. & M. Co.

Fare Boxes
- Cleveland Fare Box Co.
- Economy Electric Devices Co.
- Johnson Fare Box Co.
- National Ry. Appliance Co.

Fence
- Cambria Steel Co.
- Midvale Steel & Ordnance Co.

Fences, Woven Wire and Fence Posts
- American Steel & Wire Co.

Fenders and Wheel Guards
- Brill Co., The J. G.
- Cleveland Fare Box Co.
- Consolidated Car Fender Co.
- Electric Service Sup. Co.

Fibre and Fibre Tubing
- Nat'l Fibre & Insulation Co.
- Westinghouse E. & M. Co.

Field Coils (See Coils)

First Aid Kits
- First Aid Specialty Co., Inc.

Flooring Composition
- Amer. Mason Safety Tread Co.

Floor Plates
- Amer. Abrasive Metals Co.

Forgings
- Cambria Steel Co.
- Columbia M. W. & M. I. Co.
- Midvale Steel & Ord. Co.
- Standard Steel Works Co.
- Williams & Co., J. H.

Frogs & Crossings, Tee Rail
- Ramapo Ajax Corp.

Frogs, Track (See Track Work)
- Wharton, Jr., & Co., Wm.

Frogs, Trolley
- Ohio Brass Co.

Fuses and Fuse Boxes
- Columbia M. W. & M. I. Co.
- Consolidated Car-Heating Co.
- General Electric Co.
- Westinghouse E. & M. Co.
- Williams & Co., J. H.

Fuses, Refillable
- Columbia M. W. & M. I. Co.
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- Ohio Brass Co.

Gaskets
- Power Specialty Co.
- Westinghouse Tr. Br. Co.

Gas-Electric Cars
- General Electric Co.

Gas Producers
- Westinghouse E. & M. Co.

Gasoline Torches
- Economy Electric Devices Co.

Gates, Car
- Brill Co., The J. G.

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- Midvale Steel & Ordnance Co.
- Standard Steel Works Co.

Gear Cases
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- General Electric Co.
- National Ry. Appliance Co.
- Nuttall Co., R. D.
- Tool Steel Gear & Pinion Co.

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- Indianapolis Switch & Frog Co
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Gongs (See Bells and Gongs)

Greases (See Lubricants)

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Grinders, Portable
- Railway Track-Work Co.

Grinders, Portable Electric
- Railway Track Work Co.

Grinding Blocks and Wheels
- Railway Track-work Co.

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- Ramapo Ajax Corp.

Guards Rails, Tee Rail & Manganese
- Ramapo Ajax Corp.

Guards, Trolley
- Electric Service Sup. Co.
- Ohio Brass Co.

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- Gladium Co., Inc.

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- Ingersoll-Rand Co.

Harps, Trolley
- Anderson Mfg. Co., A. & J. M.
- Electric Service Sup. Co.
- More-Jones Br. & Metal Co.
- Nuttall Co., R. D.
- Star Brass Works

Headlights
- Electric Service Sup. Co.
- General Electric Co.
- Ohio Brass Co.

Headlining
- Pantasote Co., The

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- Economy Electric Devices Co.
- Gold Car Heating & Lighting Co.
- National Ry. Appliance Co.
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Heaters, Car, Hot Air and Water
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- Ohio Brass Co.

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- Irvington Varnish & Ins. Co.
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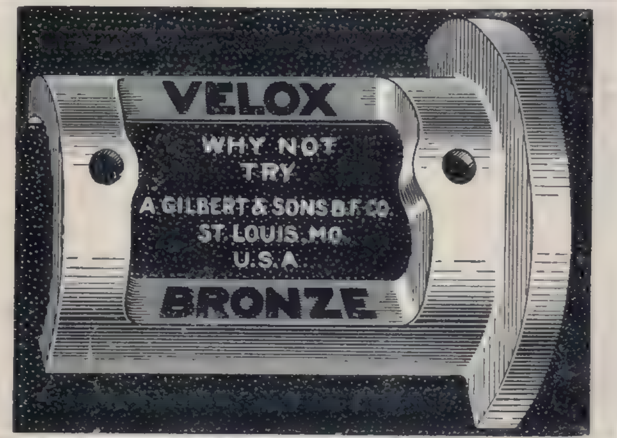
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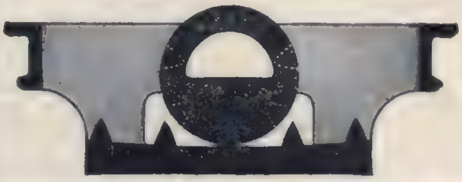

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  - Westinghouse E. & M. Co.
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  - More-Jones Br. & Metal Co.
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  - Electric Service Sup. Co.
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  - More-Jones Br. & Metal Co.
  - Westinghouse E. & M. Co.
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  - Stucki Co., A.
- **Bearings, Roller**
  - Stafford Roller Bearing Car Truck Corp'n.
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  - Columbia M. W. & M. I. Co.
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  - Electric Service Sup. Co.
- **Benders, Rail**
  - Railway Track-work Co.
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  - Babcock & Wilcox Co.
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  - Midvale Steel & Ordnance Co.
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  - Railway Track-work Co.
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  - Electric Service Sup. Co.
  - Hubbard & Co.
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  - National Ry. Appliance Co.
  - Westinghouse Tr. Br. Co.
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  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
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  - Le Carbone Co.
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  - Mitten-Traylor Incorporated
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  - Brill Co., The J. G.
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- **Cambric, Tapes, Yellow & Black Varnished**
  - Irvington Varnish & Ins. Co.
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  - Elec. Service Supplies
- **Car Panel Safety Switches**
  - Consolidated Car-Heating Co.
  - Westinghouse E. & M. Co.
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  - Differential Steel Car Co.
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  - Brill Co., The J. G.
  - Cambria Steel Co.
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  - McGuire Cummings Mfg. Co.
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  - Electric Equipment Co.
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  - General Electric Co.
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  - General Electric Co.
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- **Crossing Manganese**
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- **Crossings, Frog & Switch**
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- **Crossings Track (See Track, Special Work)**
- **Crossings, Trolley**
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  - Smith Heater Co., Peter
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- **Greases (See Lubricants)**
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  - Railway Track-work Co.
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  - Ohio Brass Co.
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- **Hammers, Pneumatic**
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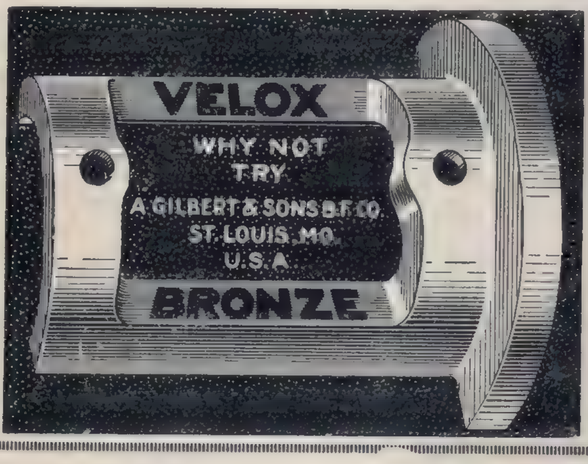

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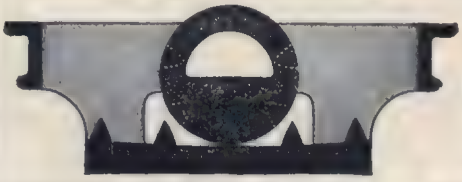

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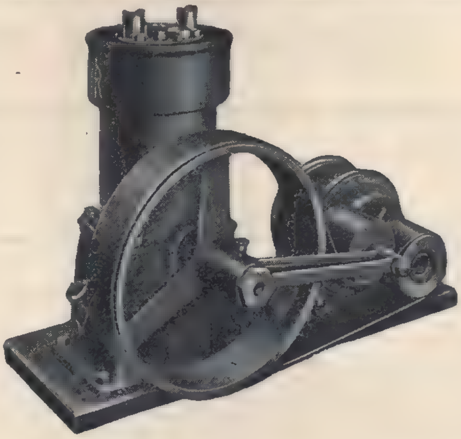

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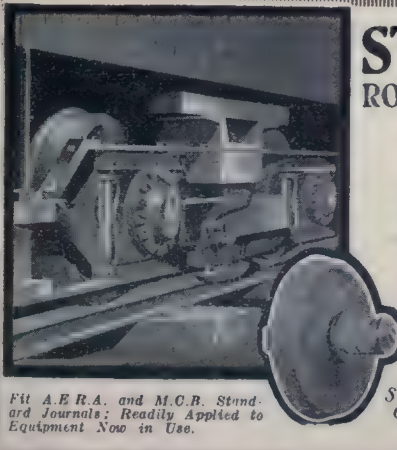

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Findlay, Ohio

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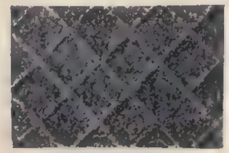

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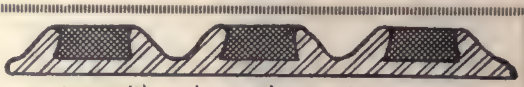

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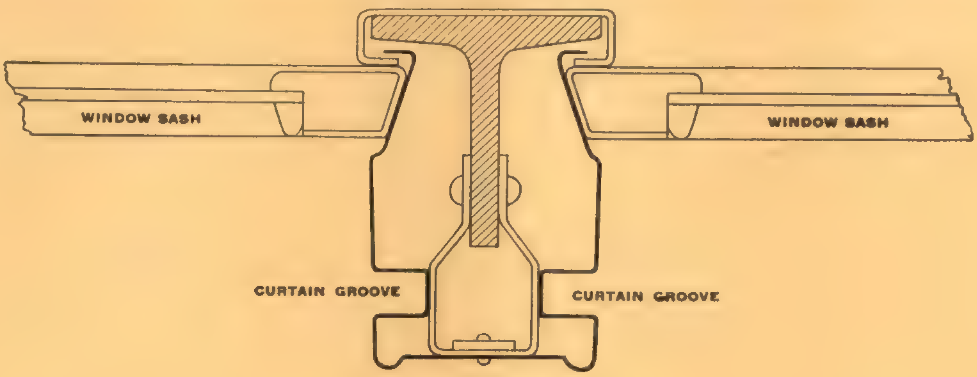
Consolidated Steel Corporation, 25 Broadway, New York, is the sole exporter of our commercial products.



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Sashes are held under compression by spring brass post casings, also giving an air and water-tight fit, and may be held at any desired height without fear of sudden dropping. Also with Brill "Renitent" Posts sashes can be removed without the aid of tools, and are interchangeable.

A copy of our Bulletin No. 229 illustrating and giving additional information will be mailed upon request.

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STAFFORD ROLLER BEARING CAR TRUCK CORPORATION

LAWTON MICHIGAN

"IT ROLLS THE FRICTION AWAY"

CABINET CONTROL

"Joe" said the Vice President, "I have just been reading your report on the exhibits at the recent A.E.R.A. Convention and must compliment you on the detailed description you have given of the many new developments in the electric railway industry. I was particularly impressed with your description of the HL Cabinet Control the Westinghouse people had on exhibit. It sounds mighty good to me."

"Boss" said Joe, "It's the slickest thing you ever saw, especially for light-weight and low-floor cars. This Cabinet Control means you can install the whole HL equipment, except the line switch, above the car floor, the line switch being placed in any convenient place beneath the floor. Everything is handy for inspection and overhauling. I think we should consider Cabinet Control for our new light-weight cars as it will give us a chance to get rid of the hand-operated circuit breakers, and later use train operation. I heard the Cincinnati Traction Company is now equipping a large number of new cars with this control."

"Well, Joe," said the Vice President, "I feel about the same as you do. Look into the matter and let me know if we could use this control to advantage on our light-weight cars."

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

W WESTINGHOUSE ELECTRIC

Westinghouse

Vol. 60, *No.* 17 New York, October 21, 1922 *Pages* 657-694

ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE, Editor

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The Economy of Knowledge

ONE of the greatest needs of the world today is for accuracy. Accuracy in its teachings, in its actions, in its beliefs. This can only come through a knowledge of economic facts.

A man may learn to drive a nail precisely, but he is a dangerous man unless he knows the effect of the driving upon the materials into which the nail enters. Progress requires an exactness of information to meet the needs of this day when no man is independent of his fellows. Without this exactness, this accuracy, efforts at advancement are endangered, and progress becomes speculative.

The great dependency of the world upon its industrial organization, not alone for comforts but for the very vitals of life, dictates that haphazard be replaced by knowledge.

Industry exacts known values and processes for its operation. And there we have the potent reason for the ever-increasing supremacy of the engineer.

But a few years ago, when demand paid whatever price was required, industry threw itself into a fury of production and thought this passing whirlwind of effort was progress.

The cost of this effort has put the world in pawn, and our pride of achievement has been pricked by the sharp point of reality. We thought we were right. It did not require the engineer to prove we were wrong. The inevitable backward swing of the balance did that.

But it has necessitated the service of the engineer to show us wherein we were wrong; and how to set about reconstruction on the sound basis of facts.

At a costly price industry now recognizes its need of the engineer; his judgments, his analyses, his technical knowledge founded on economic facts.

And progress is now following the trails blazed by the engineer for the benefit of all men; for the engineer has proved the economy of knowledge.

McGRAW-HILL COMPANY, INC.

[The statement printed above is the second advertisement of the McGraw-Hill Company, picturing the influence of the engineer in the affairs of the world. This advertisement occupied one-half page in the issue of the *New York Times* for Oct. 11.]

Circulation of this ssue, 5,650 **Advertising Index—Alphabetical, 52; Classified, 48, 50; Searchlight Section, 45**

RAILWAY maintenance men everywhere are learning the virtues of WABCO.

WABCO

WABCO is the new Brake Cylinder Packing Cup which in two years has upset every precedent for packing cup efficiency and economy.

WABCO simply doesn't wear out under ordinary conditions. It stands up with a firm, resilient body, remains always airtight, is not injured by oil or water, nor affected by any cylinder temperature found in actual operation.

We developed WABCO to give the railway industry a better packing cup *material* and a better packing cup *design* than it had ever known before.

We wanted a packing that would eliminate brake cylinder leakage—and something that would give *indefinite wear.*

WABCO does both!

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WESTINGHOUSE TRACTION BRAKES

High Tension Porcelain Pays on Low Voltage

No. 25009—actual size

No. 26500—actual size

Why have more and more railways come to the use of O-B XH Insulators for strain insulators? Because they have discovered that it pays to use high tension (wet ware) porcelain on their cross spans and guy wires.

O-B XH Insulators are made by the same process and to the same standards as the O-B Insulators which carry the highest voltages and the heaviest mechanical loads in the power transmission field. What has that to do with 500 Volt railway insulation? Everything!

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You get a lot for your money in O-B XH Insulators. A busy factory, with every modern facility, turns them out in large quantities at a price you can afford to pay.

Prompt delivery at present.

The Ohio B Brass Co.

Mansfield, Ohio, U.S.A.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

New York Philadelphia Pittsburgh Charleston, W. Va. Chicago Los Angeles San Francisco Paris, France

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Insurance plus
Marsh & McLennan Service

Additions and Betterments

When plans are taking shape for additions and betterments, you can profitably employ the services of Marsh and McLennan engineers.

They enable you to safeguard profits, eliminate hazards and reduce insurance cost.

Business executives of many of our large corporations have used this service profitably.

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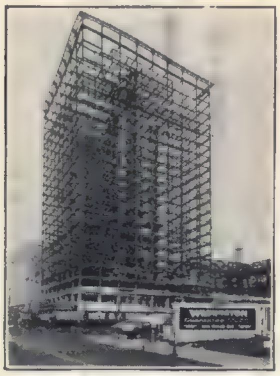
Roads, Buildings and Bridges depend on steel and concrete for permanence—Why not your new paved track?

Triangle Steel Wire Mesh reinforces concrete road.



Steel and Concrete are indispensable in modern buildings.

Steel Twin Ties on a concrete highway bridge.

Write or wire today for complete proposition including delivered price, track plans, cost estimate per foot of track and shipping date.

There is still time to make it "CONCRETE AND STEEL TIES IN 1922."

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CLEVELAND, O.

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$159,928 Saved On One Tie Order

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Uniform in Inspection
Uniform in Treatment

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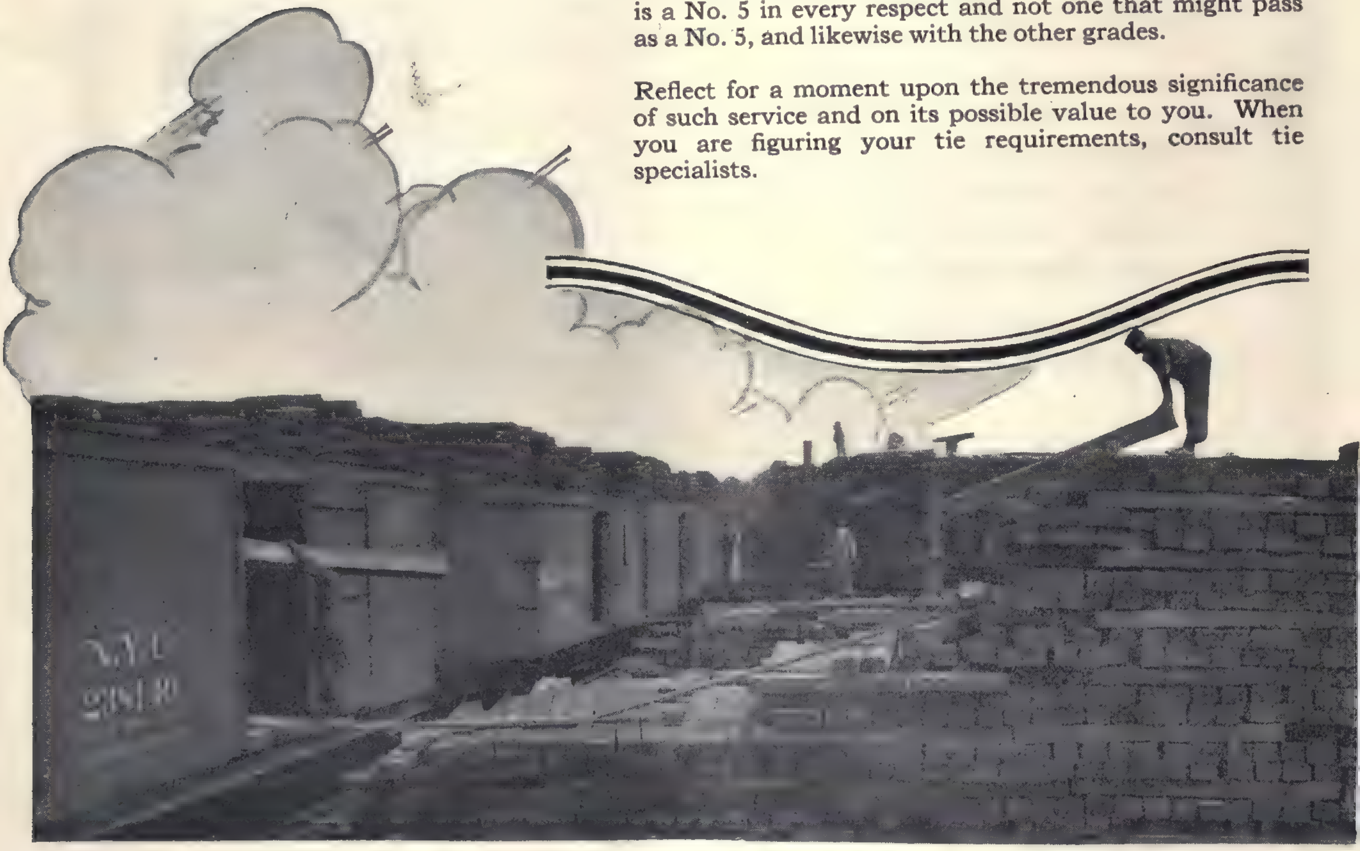
Because of our intimate knowledge of the field, the magnitude of our operations and the care in completing the order, we were able to produce these ties, inspect and grade them in exact accordance with the A.R.E.A. specifications at a cost to the road of $159,928 below the fixed price. This amount was saved for the railroad. Every tie was sound and true as representative of International products. When a tie is marked a No. 5, it is a No. 5 in every respect and not one that might pass as a No. 5, and likewise with the other grades.

Reflect for a moment upon the tremendous significance of such service and on its possible value to you. When you are figuring your tie requirements, consult tie specialists.



International Creosoting and Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

LIGHT

Safety Car Lighting Fixtures

The flexibility of the metal fingers provides for expansion and contraction of the reflector, and also cushions the glass against any severe jolt of the car. Notwithstanding this flexible grip, it is impossible for the reflector to fall or rattle in the holder.

KEYSTONE Car Specialties

Air Sanders
Air Valves
Golden Glow Headlights
Illuminated Destination Signs
Steel Gear Cases
Safety Car Lighting Fixtures
Motormen's Seats
Faraday Car Signals
Trolley Catchers
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Samson Cordage
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Fare Register Fittings
Cord Connectors
Rotary Gongs
Standard Trolley Harps
Standard Trolley Wheels
Automatic Door Signals
Trailer Connectors

When days grow shorter—

riders have more of an opportunity to notice the lighting systems of your cars. Rattling, globeless lamps will be more conspicuous than ever.

So will good lighting and firm, quiet fixtures.

This latter fact has been proven where Safety Car Lighting Fixtures have been installed. They enhance the interior attractiveness of your cars and afford your riders greater eye comfort.

The use of Safety Car Lighting Fixtures in your cars will eliminate broken glassware and decrease installation and lamp renewal costs. These fixtures when used in combination with proper reflectors and Mazda lamps reduce the number of lighting units required to properly illuminate the car. Thus a saving in current consumption over bare lamps is also effected.

Safety fixtures fit all types of cars, being made in straight pendant form with round or square bases (illustrated); in angle base pendant from and in bracket form. Made in various sizes to use with standard 23, 36, 46, 56, 72 and 94 watt Mazda series lamps.

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Manufacturer of Railway Material and Electrical Supplies

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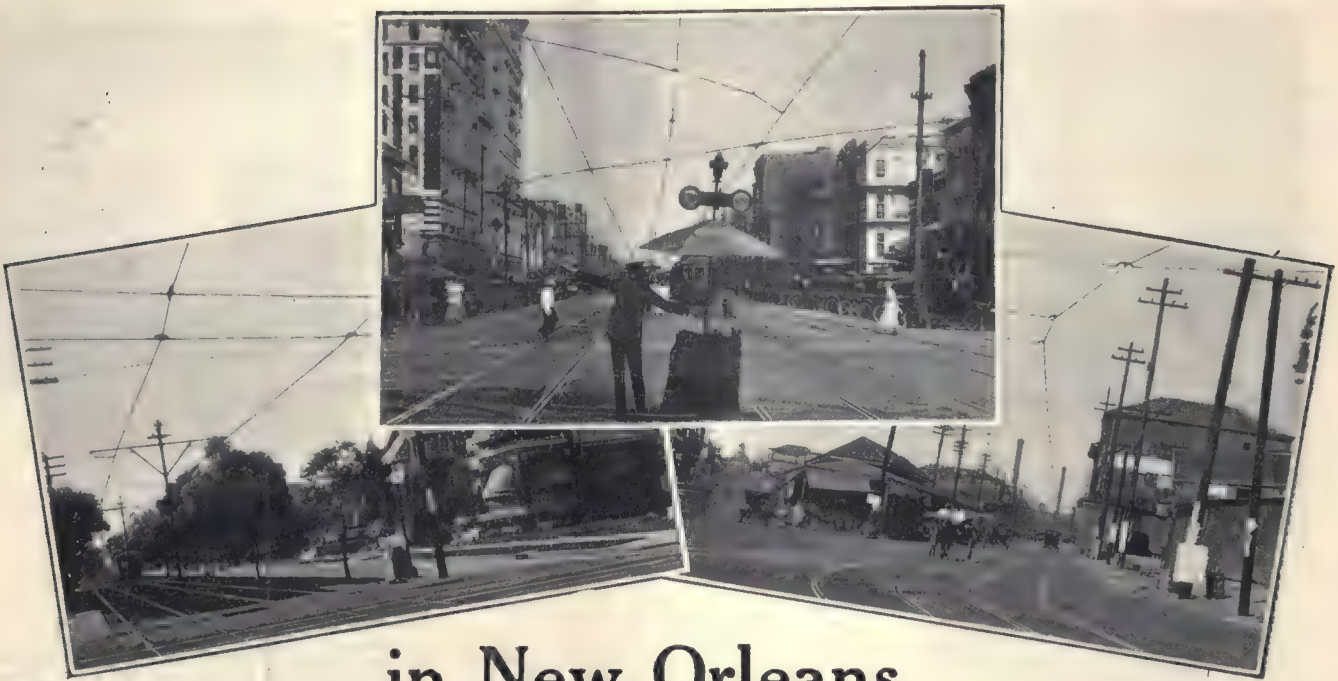

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Phono-Electric

—has a long life and a busy one

"Bridgeport" BRASS CO. TRADE MARK U.S.A.

Fifteen years ago Phono-Electric was first tried on one line in the Crescent City.

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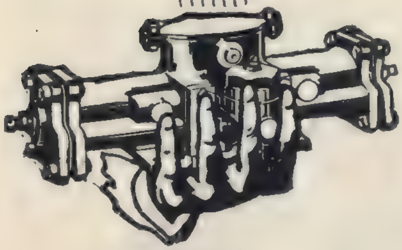
Phono-Electric—The Answer to Why—is WEAR!

Bridgeport Brass Company
Bridgeport Connecticut



On Again! Off Again!

You know the kind of passenger that jumps on just as the car is starting, finds out it's the wrong car and leaps headlong for the granite paving again. Who stands the damages is the next question?

Modern interlocking pneumatic equipment stops that kind of business. Passengers can't jump on *when* door is closed! Car can't start *until* door is closed! Passengers can't jump off again *after* door is closed! That's why National Pneumatic door and step devices end the "boarding and alighting" variety of accidents.

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Door and Step Control
Door and Step Operating Mechanism
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control

National Pneumatic Company, Inc.

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Works: Rahway, N. J.

Manufactured in Canada by Dominion Wheel & Foundries, Ltd.
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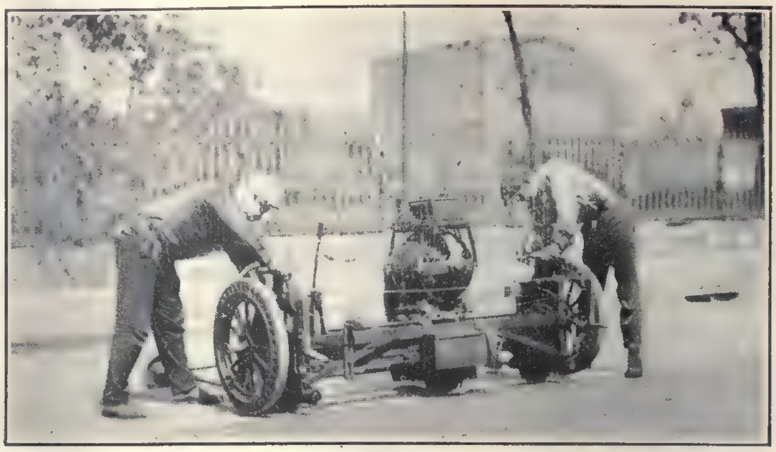


UNIVERSAL

Rotary Track Grinder

Possessing the widest range of usefulness in track grinding operations, substantial, rugged and an extremely fast-worker, the Universal Rotary Track Grinder is the choice wherever the policy is to provide the best and most efficient equipment. Its oustanding features are:—

1. Large Rubber-tired Derail Wheels.
2. Outboard Bearing on Grinding Wheel Arbor.
3. Tilting Grinding Wheel to grind on angle of rail head.
4. Adjusting outrigger.
5. Easy adjustment and access to all parts.
6. Simplicity of operation.

For Track Maintenance

Welding and Grinding Equipment

AJAX ELECTRIC ARC WELDER

A 155-lb. high capacity resistance welder, especially designed and built for efficient maintenance of railway track.

RECIPROCATING TRACK GRINDER

Unsurpassed for removing all trace of corrugations from straight and curved track. Maintains the original contour of railhead.

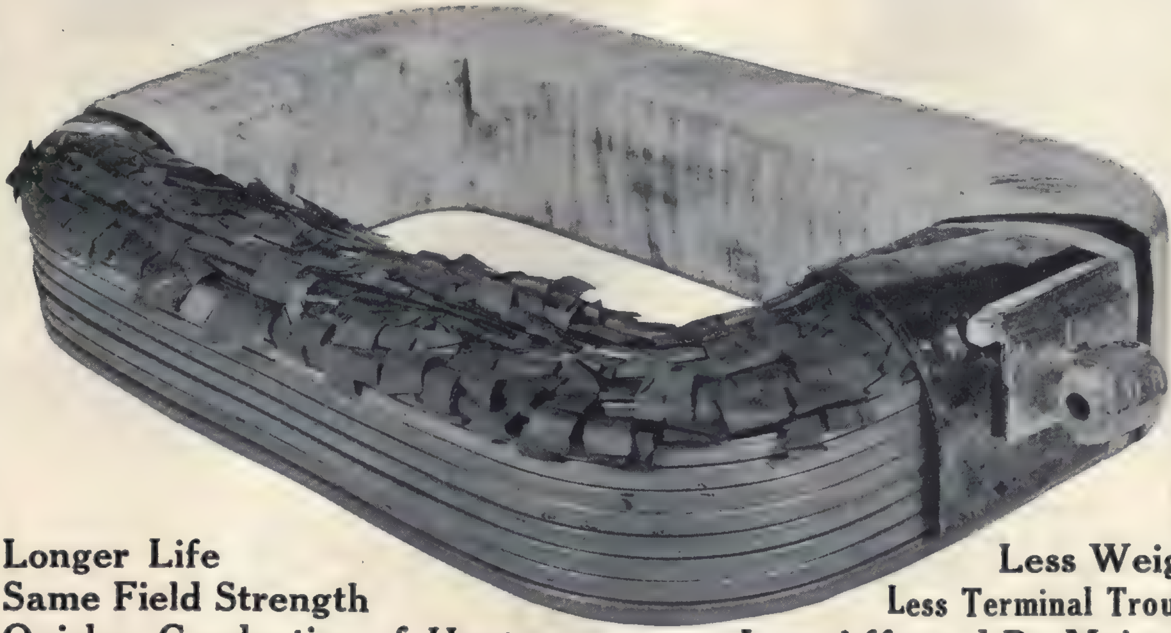
ATLAS RAIL GRINDER

An efficient rotary grinder, high speed, light and suitable for working under heavy traffic conditions.

Write us for full details and prices for complete track welding and grinding equipment.

Railway Track-work Co., 3132-48 E. Thompson St., Philadelphia, Pa.

GOING STRONG



Longer Life
Same Field Strength
Quicker Conduction of Heat

Less Weight
Less Terminal Trouble
Less Affected By Moisture

The quicker distribution of heat in Aluminum field coils is due to an almost solid metallic path to the exterior via large square wires.

With coils of like resistance the heat generated is identical and aluminum coils are wound to closely duplicate copper coils.

They have the same number of turns and repeated tests show that Lind Aluminum coils develop and maintain full field strength.

The Aluminum oxide insulation is an integral part of the conductor—which, means, that these coils are less affected by heat and mositure, and since there is no cotton insulation to char or bake out *shorted fields are practically eliminated.*

The high specific heat of Aluminum compared with copper is another valuable characteristic, especially in coils that are loaded intermittently, as in Railway Service.

Consider these long-life features in addition to that of saving half the weight of all the field coils of every car in many cases a weight reduction of more than 1000 lb.

Let us quote you prices and answer detailed questions

ALUMINUM FIELD COILS

Economy Electric Devices Company

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L. F. Gould, *President*
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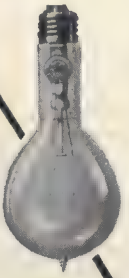

Some of the products our Distributing Houses can provide.

- Cap and Cones
- Insulating Material
- Insulators, all types
- Kalamazoo Trolley Wheels
- Magnet Wire
- Shelby Poles
- Tapes and Compounds
- Trolley Wire
- Electric Hammer Drills
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- Portable Utility Lights —in fact everything electrical

How You Can Lower the High Cost of Buying

The cost of buying includes Selection—Delays—Warehousing—Inspection—Rejections and the wastes of time and money tributary to each.

But it is not necessary for buyers of electrical goods to stand 100% of these costs.

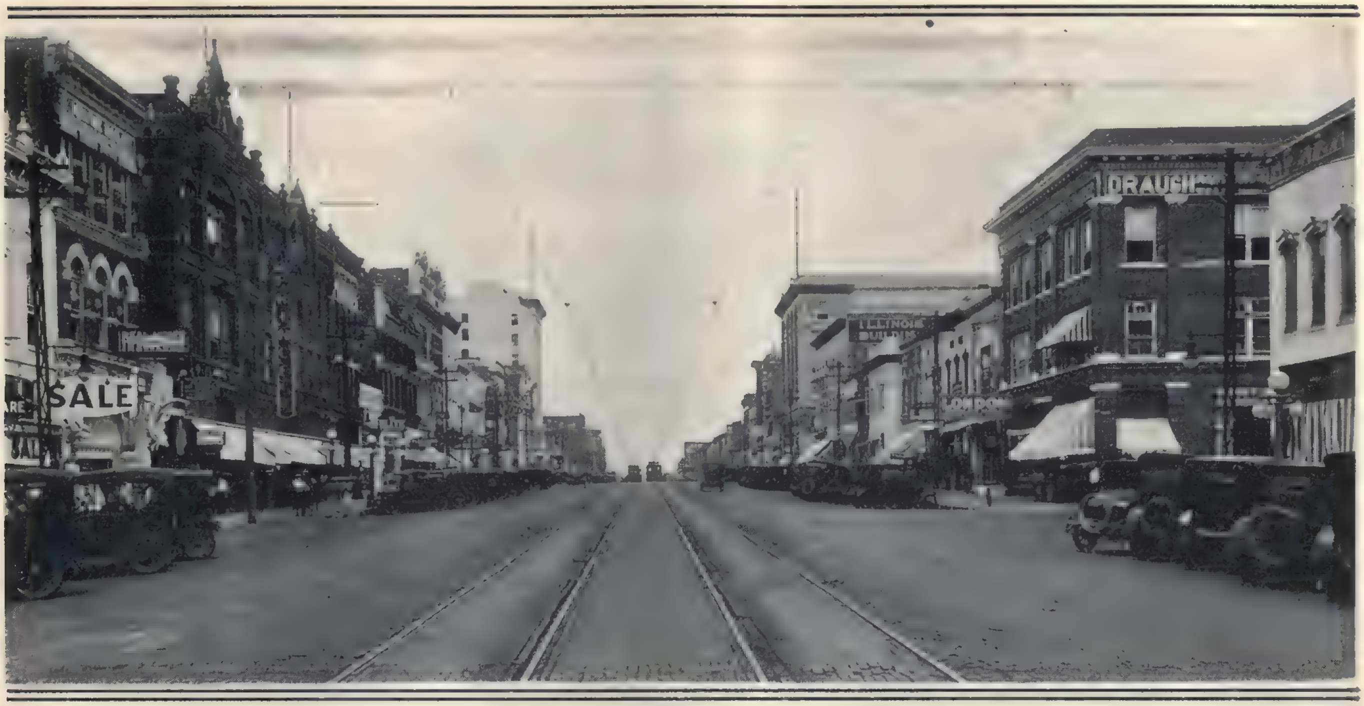
They can be split by using the Western Electric House near you. It can cut these costs materially. It can provide everything electrical. It can cut your buying costs by reason of its function as distributor for a long list of manufacturers—its long experience as a buyer of electrical goods and its large stocks near you.

Its location practically brings to your door all these elements that cut the cost of buying.

*A
NATIONAL
ELECTRICAL
SERVICE*

Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES



Bates Steel Poles

Strong, permanent overhead construction with street lighting and distribution lines on the same poles is unobtrusive and most economical when Bates Expanded Steel Poles are used.

The poles and cables along this street in Ft. Smith, Arkansas, present a pleasing appearance, and are of the utmost utility. As will be seen, these Bates poles carry lighting brackets, and the distribution lines for arc lights as well as feeder cables and electric railway overhead.

Bates Expanded Steel Poles are easily set in the regular sidewalk curb, and the concreted pole butt prevents any deterioration of the steel pole base. The character of the Bates concrete setting, besides fitting into standard curb construction, holds the Bates pole safely in an interlocking steel and concrete pole butt.

These Bates Poles now cost less than any comparable pole of any other type, as well as giving greater strength and life with least maintenance.

Ask our engineering staff for data and prices.

Bates Expanded Steel Truss Co.

208 South La Salle Street, Chicago, U. S. A.

District Sales Offices in all
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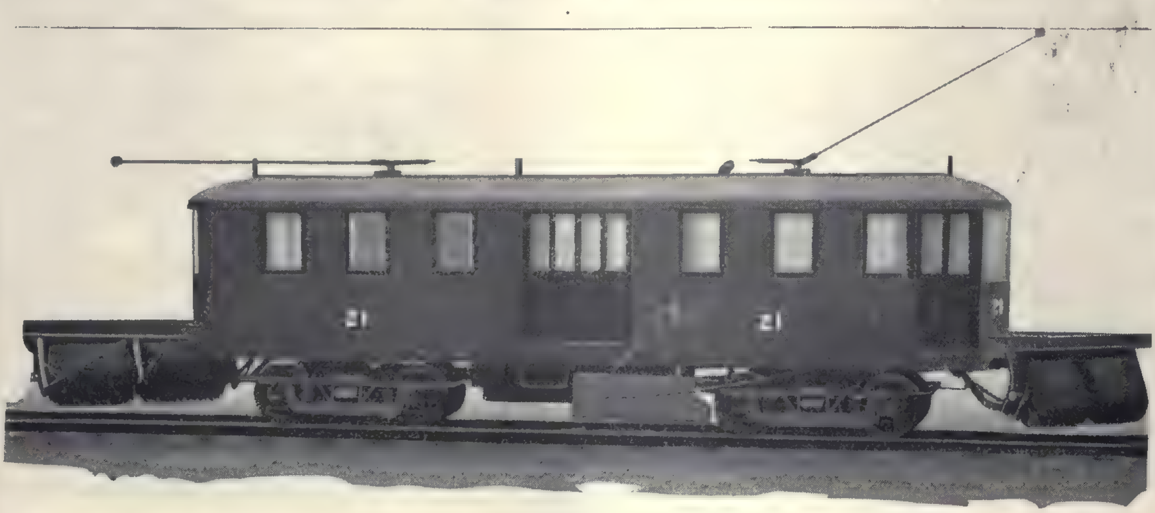
BATES ONE PIECE EXPANDED STEEL POLES

Snow Fighting Equipment



Double Truck, Steel Underframe Sweeper

THE utility and economy of this Combination Snow Sweeper and Baggage, Express and Work Car are obvious. It is adaptable for service in all seasons of the year. Extreme length is 49 ft. 1 in. over the brooms. Exterior width over all is 8 ft. 6 in. when used as Snow Sweeper.

The car body over the buffers, with the brooms removed, when used as a work car is 35 ft. 0 in. in length.

The underframing of the car is entirely of structural steel, sills being 8 in. "I" beams; buffers 7 in. by 3– in. angles. The frame is braced diagonally, making the same very rigid and strong. The super-structure of the car is of wood, of standard baggage car construction. Car is sheathed both inside and out. Roof is of the "turtle deck" type, covered with No. 8 cotton duck.

Brooms and broom-driving mechanism, also the side plows can be readily removed in order that car can be used as express baggage, or work car during summer months.

Blueprints and specifications will be submitted on request.

Selected Snow Sweeper Rattan
on Hand, ready for Immediate
Shipment.

McGUIRE-CUMMINGS MANUFACTURING CO.

GENERAL OFFICES
111 WEST MONROE STREET
CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars,
Snow Sweepers, Electric Locomotives.

Cause, Effect and Remedy

The influence of lubrication upon operating efficiency should not be underestimated. To improper lubricants may be traced many expensive repairs and replacements in street railway service.

Burnt bearings are simply the result of inferior lubrication. With right oils and correct methods the bearing parts are protected and preserved to maximum service life.

The highly efficient operation of the hundreds of electric lines under Galena lubrication—their freedom from mechanical troubles of this nature—is a condition worthy of the careful consideration of all operating officials of electric railways.

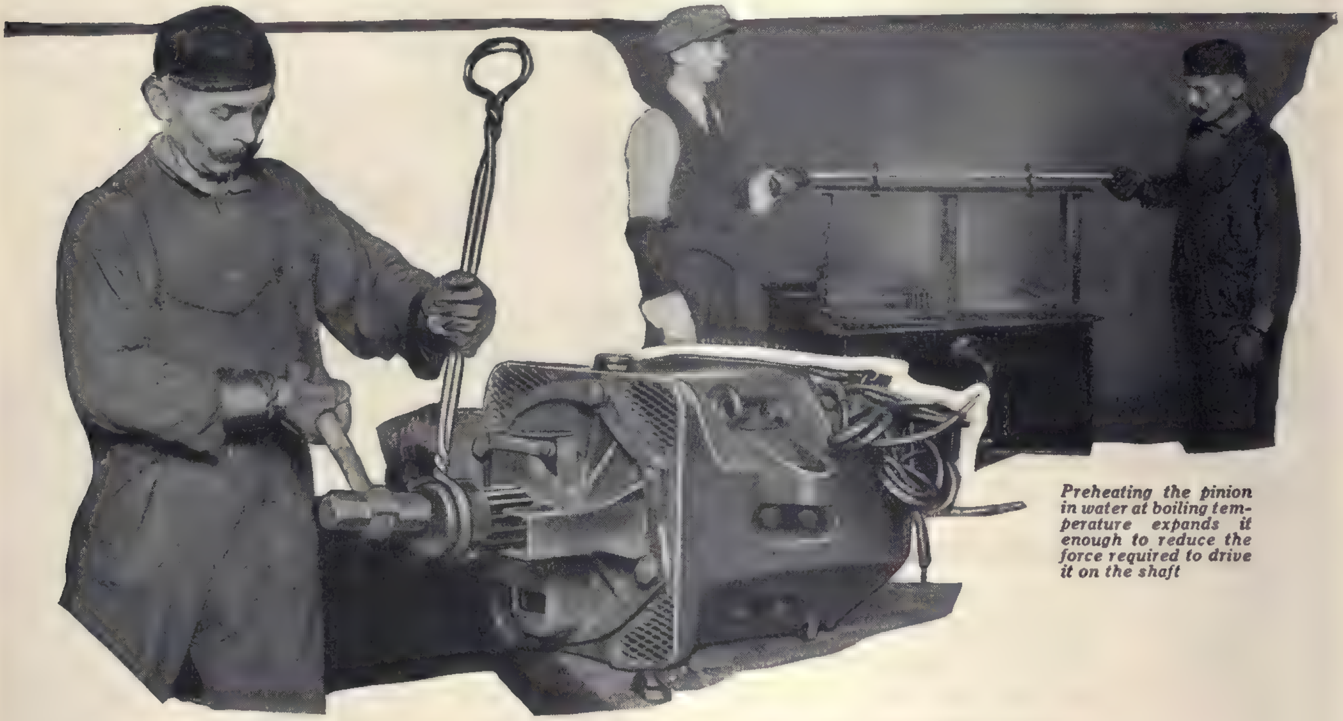
The ability of Galena Service Engineers to install and carry through successfully the methods that have everywhere given such satisfactory results should be also an incentive to secure the kind of lubrication service that has repeatedly demonstrated its value.

"When Galena Service Goes In
Lubrication Troubles Go Out!"

Quality Proven By Competition!

Galena-Signal Oil Company
New York - Franklin, Pa. Chicago
and offices in principal cities

More miles per dollar from gearing is assured by careful installation as well as by high-quality steel



Preheating the pinion in water at boiling temperature expands it enough to reduce the force required to drive it on the shaft

Using a 4-lb. hammer for seating small pinions prevents setting up excessive stresses in the metal

HOW does your shop seat motor pinions—that important little device for probably the hardest job of all? Proper care in this operation is sure to be reflected in longer pinion life. Too much driving force means a pinion crippled before it gets in service.

The *small* pinions, used on motors for Safety and other light weight cars, necessitate extra care in mounting. On account of the thinness of the metal between bore and root of tooth they cannot stand sledge hammer blows. Preheating for expansion, therefore, is desirable, and then using a rawhide mallet, an ordinary 4-lb. hammer, or lead hammer, is an additional safeguard.

A study of the causes of long life or premature failures of motor pinions under various conditions offers convincing proof of the importance of careful mounting.

There are G-E engineers who give special attention to these problems. Can they be of service to you?

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
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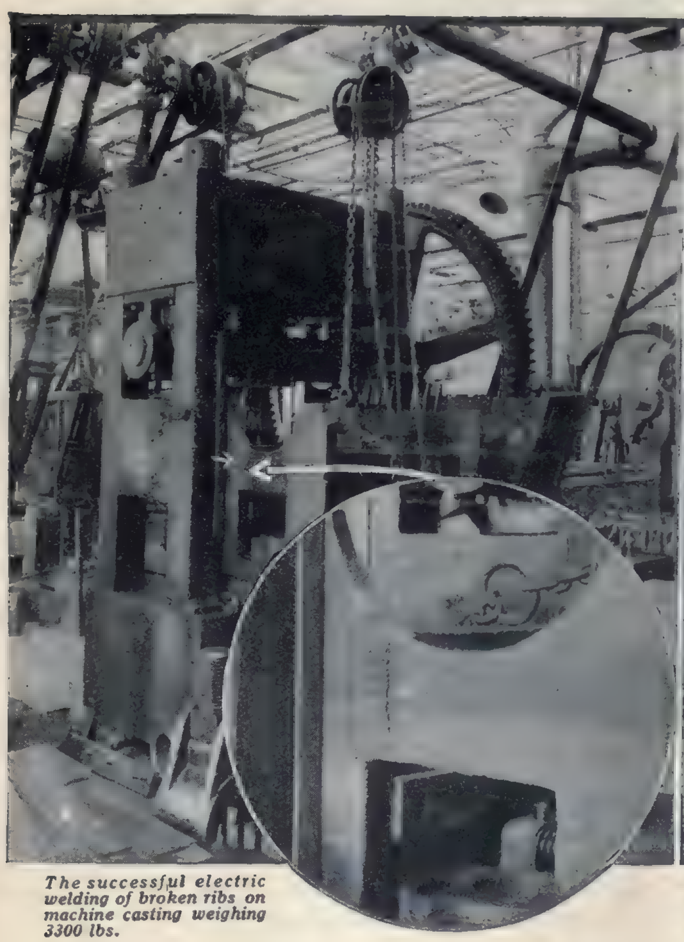
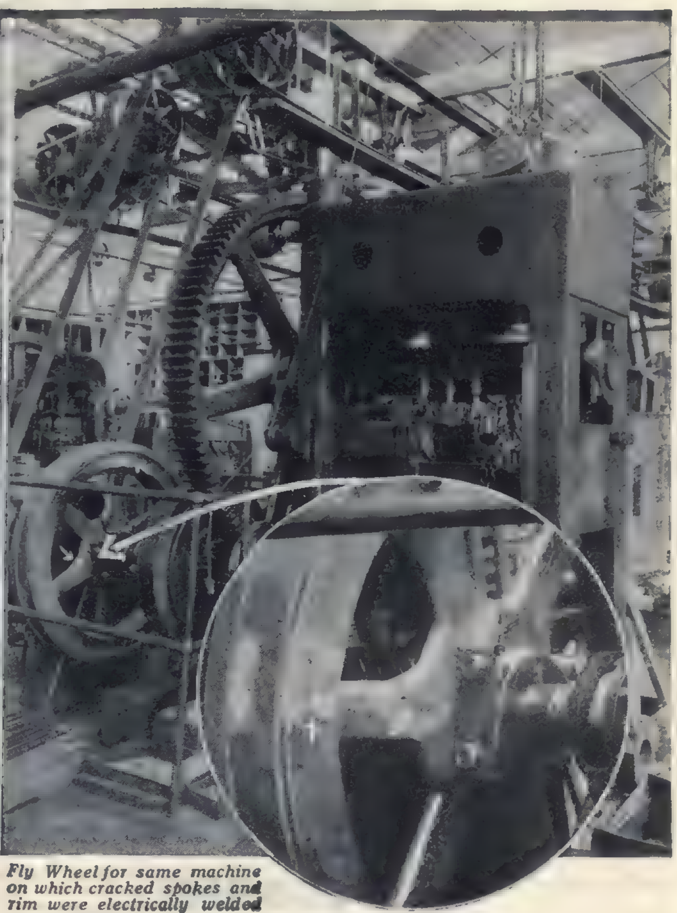
Electric welding saved this machine



The successful electric welding of broken ribs on machine casting weighing 3300 lbs.



Fly Wheel for same machine on which cracked spokes and rim were electrically welded successfully.

The following extract is from a letter to us by Enoch Ohnstrand, Chief Engineer, LIBRARY BUREAU, Ilion, N. Y.

"We figure that this repair on this machine showed a sufficient saving to pay for the installation of our electric equipment, as the machine which was broken down was a special machine made years ago for this Company, and even if it had been an up-to-date machine, we could not have purchased this part for anywhere near the price of the electric welder which we purchased from you and which we used for doing this work. I am pleased to advise you that we got splendid results from the job and in a very short time. The repairs, so far as welding was concerned, were made in about three hours actual time."

The line of G-E Electric Arc Welders includes types of stationary and portable sets for hand welding—and automatic and semi-automatic machines. G-E Specialists are at your service to select the equipment essential in electric welding processes for repairs, production or salvage in your plant.

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amount. Finally, the number of those injured in railway accidents both through their own negligence and that of the company should be greatly reduced. This of itself is a great gain because whether a person is injured through his own carelessness and receives no compensation or is injured through a railway's negligence and receives compensation, he would much prefer to be whole, and the reduction of the number of such persons should greatly reduce the number of those in any community with grievances against the company.

Altogether the change made by the Claims Association in its constitution is a wise one and should stimulate that organization to even better future service.

Electric Railway Men Are Eligible to Join the A.S.M.I.

AT ITS annual convention, held in Cleveland during the week of Oct. 2, the American Society for Municipal Improvements voted to amend its constitution so as to permit engineers employed by public utilities to hold the grade of active membership. This action is highly commendable and can have no other effect than to be to the mutual advantage of the society and the engineers concerned. The municipal engineers and those employed by public utility corporations have many problems in common. The scope of activity of the engineer for a utility company is very largely along lines which overlap the field covered by the municipal engineer and frequently calls for the closest kind of co-operation with the latter. Both are community builders and the action of the society should result in fostering a better relationship between these two classes of engineers, something which is greatly to be desired. The society will profit through being able to make use of the additional engineering talent which will now be available for its specifications committees, and the utility engineer, as well as the corporation by which he is employed, will profit through the broadening of his field of activity and through the representation he will have on matters which vitally concern public utilities.

The Spirit of Research Is Commended by Mr. McCants

IN A VALUABLE paper contributed to the discussion of the report of the Transportation & Traffic Association committee on personnel and training of transportation department employees, read at the Chicago convention, M. McCants, assistant general manager Market Street Railway, San Francisco, said some rather unusual things on the subjects covered by this committee report. He disclosed in a general but helpful way some details of what the San Francisco company has been doing to improve the characteristics of its employees and to reduce labor turnover. In general, Mr. McCants approved heartily of the suggestions and recommendations of the personnel committee, but above all he commended the underlying spirit of research which the report illustrated. He showed in his contribution that his company is maintaining a research attitude toward the live problems of the electric railway business. In fact, the way in which it has tackled the job of improving its methods of selecting and training employees shows the real scientific spirit. This sort of thing is expected in a college or scientific society; it is comparatively rare in the transportation field.

The committee on personnel and training had hoped to do some actual experimental work during the past year, in applying so-called psychological tests to selected groups of employees and applicants for employment, analogous in a way to the research which the American Bureau of Welding committee on welded rail joints will make during the coming year with the support of the American Association. The association did not see its way clear to finance the psychological tests last year, but it is to be hoped that such support will be forthcoming soon. The association has made a good start in appropriating money for the rail-joint tests. It is important to have information as to the best method of track construction, particularly of joint construction. By the same token, electric railways need the best possible information as to their prospective and present employees. Mr. McCants showed that research is necessary to secure such, and his company, among others, is making research in this direction. This reinforces in a practical way the recommendations of the committee.

Data Show A. E. S. C. to Be a Going Concern

THE fact that the American Engineering Standards Committee is already beginning to exert a potent influence in industry is indicated by the facts that twenty-four standards of various grades have already been approved and that 106 projects are now before the committee in different stages of completion. Of the latter a dozen were initiated by the American Electric Railway Engineering Association and electric railway engineers are interested in a number of projects emanating from other bodies. All of the Engineering Association projects are in the stage of progress next to the last; that is, they are "proposed standards submitted for adoption." This means that unless something unforeseen develops they will become standards within a short time. It will be encouraging to those who are anxious to get some actual transportation standards into force to realize that there is not to be a lot of red tape to be unwound before the standards have a chance to show their effectiveness.

The coming calendar year is an important one in connection with the putting through of American standards, because until Dec. 31, 1923, standards which are accepted by recognized organizations can skip all preliminary stages of progress and go at once to grade 6, the one in which the Engineering Association standards are now found. It behooves every technical committee of the Engineering Association, therefore, to round up its standardization work so that all propositions which can be put into acceptable form during 1923 may be submitted to the A. E. S. C. This may mean some tedious and strenuous work on the part of some committees, but it ought to be done in the interests of general economy of later efforts. The standardization work of the association so far submitted has been commendable and apparently is going through.

Discussion at the Chicago convention showed a disinclination to attack any new problems in standardization that would later have to be solved from the beginning under the auspices of the standards committee, but the situation is entirely different with standards already practically complete. Some of these need but a few finishing touches, while others will require a lot of work. Whatever they need they ought to have in the way of effort to finish them. Later it may take years to accomplish what can now be done in a few months.

Holding Company and $114,211,634 of Securities to Be Wiped Out

THE storm clouds that threatened receivership for the Interborough Rapid Transit Company, New York, apparently have been lifted. Action is still pending from one source looking toward the appointment of a receiver for the company, but it is not expected that the court will take cognizance of this plea, particularly under the present circumstances. The latest augury of good in the company's favor is the plan advanced by the bondholders of the Interborough Consolidated Corporation, the holding company, calling for the elimination of all the securities of that company. The consummation of this plan is expected to prevent disintegration of the system. Under it there will be eliminated all of the $63,808,000 of 4½ per cent Interborough-Consolidated bonds, all of the $45,740,500 of preferred stock of that company and all the common stock, which at $5 nominal rating a share would be valued at $4,663,134.

These securities have all been treading on very thin air ever since that company succeeded the late lamented Interborough-Metropolitan Company, and any hope of value for the future that appeared to be ahead of them disappeared with the destruction of the high earning power of the Interborough Rapid Transit Company, operating the rapid transit and the elevated lines. Pledged to secure the bonds of the holding company was the stock of the Interborough Company, which now will be distributed among the holders of the bonds of the Interborough Consolidated Company.

To say that this particular holding company was ill-conceived and in the nature of a financial monstrosity is simply to reiterate the warning of students of corporation finance made years ago, but ignored by the creators of the company at the time of its inception. The only ray of sunshine discernible in the clouded financial sky is that the Interborough itself apparently has been saved from disaster, although the Manhattan stockholders, whose guaranteed rental is now to be scaled down by compulsion, are not overjoyed at the prospects of the meager return immediately ahead for them. In the rapidly changing traction history in New York the Interborough-Consolidated Corporation had come by a process of elimination of first one branch and then another to be entirely dependent for income on the return from its Interborough Rapid Transit stock holdings. With the changing in the economic status of the Interborough Rapid Transit Company and the passing of the dividend by it in April, 1919, the holding company was reduced to a state of financial impotence. As the *Wall Street Journal* said editorially in its issue of Oct. 12: "The holding company had been dead for years, and there was nothing for the reorganizers to do but inter it."

As a study in corporation finance, a brief review of the situation affecting the holding company would seem advisable. The original holding company, the Interborough-Metropolitan, was formed in 1906 with $45,740,000 of 5 per cent cumulative preferred stock and $93,262,000 of common stock to take over all the New York city surface lines and the Interborough Rapid Transit Company. Inside of a year and a half the company which operated the surface roads was forced into the hands of a receiver, leaving the Interborough-Metropolitan with only one means of support, the Interborough Rapid Transit Company. As a result by 1915 about 40 per cent back dividends had accumulated on the holding company's 5 per cent preferred stock. It was to get rid of these back dividends and the troublesome cumulative dividend clause that the Interborough-Consolidated Company was formed. The successor holding company, the Interborough Consolidated, had $45,740,000 of non-cumulative preferred stock and 932,620 shares of common stock with no par value. There was also outstanding $67,825,000 of 4½ per cent bonds. Back of this for earning power was the $33,912,800 of stock of the Interborough Rapid Transit Company owned by the holding company and the $15,270,100 of stock of the New York Railways, the successor after foreclosure to the old Metropolitan Street Railway. Early in 1919 the New York Railways itself succumbed and went into receivership. As indicated previously the quietus of the holding company was sounded in April, 1919, when the Interborough Rapid Transit suspended dividends, for the source of income was cut off with which payments had previously been made by the Interborough Consolidated to its bondholders.

As has been stated already, the holding company will pass out of existence in the scheme for reorganization now before the commission for approval. Further, the plan provides for a continuation of the 5-cent fare, limitation of dividends (of which there are to be none for a period of five years) to 7 per cent as a maximum, elimination of the burdensome features of the lease of the Manhattan Elevated Railway under a fixed rental, provision for securing new capital and a stipulation arranging for representation by the public on the board of directors of the railway. These are among the more important features. There certainly is a lesson in them of the trend events are taking in city railway operation.

The changes proposed are drastic. They do not appear, however, to be any more drastic than needed under the circumstances to save the situation and avoid throwing the Interborough Rapid Transit itself into the hands of receivers. It has, indeed, been a feat of diplomacy to harmonize all the different security interests, and for their accomplishment in this respect great credit is certainly due to the committee of security holders headed by Mr. Murphy and to those acting for the Manhattan stockholders, who accept a scaling down of the guarantees made previously by the Interborough Rapid Transit Company to them. The easy thing to say, of course, of the Manhattan holders is that they were compelled to submit, but that is not altogether true.

In over-ruling objection to confirmation of the sale of the Interborough Consolidated collateral, Judge Mayer of the Federal Court said that he had lived with the situation day in and day out for many months. In view of the complexities of the situation it is easy to believe this statement. To him also is great credit due for the turn for the better which affairs have taken. As for the Transit Commission, the proposed plan of reorganization appears to meet the fundamental conditions laid down by it last spring as part of the commission's elaborate unification plan still in the making. No matter what the final outcome may be of that plan, the present reorganization move is another feather in the cap of the commission in its effort to better service on the transit systems in New York and bring about a settlement of the transit problem along lines that give evidence of stability for the future. Certainly, as one financial authority has said, it has been demonstrated that there appears to be no place in so rigidly regulated a field as city traction for a holding company which had taken nominal control of operating companies at inflated valuations.

Cast Welded Joints in Brooklyn

The Brooklyn Rapid Transit Company Has Had a Large Number of Cast Welded Rail Joints in Service Since 1911 and the Excellent Results Obtained Have Led the Company to Make This Type Standard for Its Lines

By G. H. McKelway
Engineer of Distribution, Brooklyn (N. Y.) Rapid Transit Company

At one time the use of cast welded joints was considered as being the most approved practice that could be reached in rail joint construction by electric railways, but more recently the popularity of that form of joint has decreased so that now but few companies use it and the practice is considered by many engineers as being a poor one. The three principal reason for the decline of the popularity of the cast weld were: First, the breaking of the joints by contraction after they had been welded; second, the belief that the hot metal poured about the head of the rail and then slowly cooling drew the temper from the steel and softened it so that the receiving ends of the rails were more easily pounded down than before; and third, the inability to make repairs other than grinding of the joint after it had once been installed.

The bringing out of a successful method of bar welding also reduced the demand for the cast weld, as the electric welding apparatus, although more cumbersome than that for cast welding, is owned by the manufacturing company holding the patents and rented to the users, the steel company supplying skilled employees as well as the welding train. This has permitted the use of the electric welding apparatus by many railways that could not afford to purchase a cast welding outfit or to employ continuously the one or two skilled men necessary to operate it. In addition, the bar weld is installed on the web of the rail and not near the head so that by the use of the bar weld there is no danger of overheating the head.

Notwithstanding the belief that the use of the cast weld joint is almost obsolete some railways are still using it and getting excellent results.

One of the companies on the lines of which cast welded joints are standard is the Brooklyn Rapid Transit Company. A large number of cast welds were installed in Brooklyn on the lines of the old Nassau Electric Railroad twenty-five or more years ago and were very successful, many of them being in first-class condition when the rails had to be removed because they were worn out. Brooklyn has also made a thorough test of the electrically welded joints, though most of them were installed on lines equipped with old rail out of which it was thought that, with an improved joint, a few more years of service could be obtained.

A thorough investigation of the joints which had been cast welded, not only in Brooklyn but in other cities as well, convinced C. L. Crabbs, the engineer of way and structures, that they could be used with perfect success and at a less cost than the electrically welded ones. Therefore, in 1911, a cast welding cupola was purchased. The company was fortunate in having on its payroll a man who could be placed in charge of the cupola as he had held a similar position with the old Nassau company fifteen years before. It was therefore unnecessary either to go to the expense of getting a new skilled man for that work or to attempt to break in an unskilled one, a procedure which might cost much more in the way of unsatisfactory joints than could be saved in the difference in wages paid to the experienced and new men.

Putting the Molds in Place

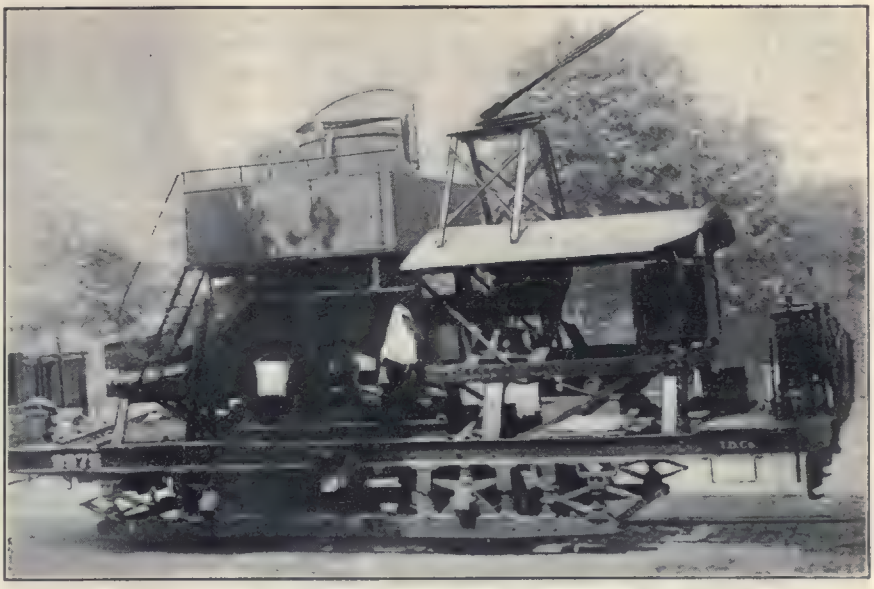
Molds in Place and Banked

Preheating the Molds

In 1911 there were 390 joints installed, a number of which were not satisfactory. In some cases the joints broke and in others the welds were sheared from the rails, permitting the ends of the latter, when contracted by the cold weather, to pull away from each other and open the joints. In the first winter twenty-three of those that had been installed in 1911 failed in one or the other of these ways and the next year eight more of those first welded became defective. There were two sections of the track welded in 1911, the smaller having only seventy-two joints and none of the joints on this section have failed as yet, although they have been in use for eleven years.

Instead of being discouraged by the poor showing made by the welds installed in 1911 the management made a careful investigation of the causes of failure and ways of preventing them. It was decided that the greatest trouble was due to the metal cooling while being carried from the cupola to the rail and therefore being merely cast around the joint instead of being welded to and becoming a part of the rails themselves.

It had been the practice to tow the heavy wagon, on which the cupola was mounted, to the location where the joints were to be welded and then set it on the street at one side of the tracks until the operation was finished. A change in this method was made by mounting the cupola on a work car equipped with its own motors and controllers so that it could be moved at any time. This permitted the car to be run up close to where the joints were to be installed and ended the trouble due to the cold metal. Another improvement was made by adding more metal to the amount poured around each joint. As a still further precaution against the danger of not making a real weld between the metal in the rail and that in the joint, the ends of the rails were preheated just before the joints were poured by the use of an oil-burning blow torch.



BROOKLYN'S CAST WELDING CAR

The quality of the metal used in the weld was improved by the addition of titanium alloy to the pig iron and scrap iron which formerly made up the entire charge. Still another improvement, although entirely of a mechanical nature, was the incorporating into each joint of four pins made of cold rolled steel each 3½ in. long and 1$\frac{1}{16}$ in. in diameter except at points ½ in. from the ends, where grooves ⅛ in. deep and ¼ in. wide were turned in them. These pins are for the purpose of getting a better bond between the rail and the weld and to help distribute the strains through the casting instead of having them all come as a shear next to the rail.

After these changes the number of the defective joints very rapidly decreased and their percentage to the whole number cast is becoming less and less with each year's operation of the welding car, due to the greater experience of the men engaged in the work. Up to the end of 1921 the failure of the joints poured in 1911 amounted to 16.13 per cent; in 1912, to only 1.46 per cent; those poured in 1913, 4.94 per cent; 1914, 3.52 per cent; 1915, 0.62 per cent; 1916, 0.41 per cent; 1917 0.05 per cent, and none of the 2,411 welds installed since 1917 have broken. These figures show that a thoroughly satisfactory joint is now being made, the efficiency having been brought up to a point where there is very little hope of appreciable improvement. During 1921 of the 15,676 cast welded joints on the system, only twenty-four were broken; eight of them having been installed in 1911, one in 1912, six in 1913, seven in 1914, and one each in 1915 and 1916.

FILLING THE LADLE

Not only has the quality of the joints been much improved but the quantity of them has been increased until the welded joints are now standard for all new construction as well as the reconstruction of old lines. Of course where there are only a few pieces of rail to be cut in or where the pieces are scattered it would not pay to use the welding car and in such places bolted joints with compressed bonds are used. Of late years many of the new construction and large reconstruction jobs in Brooklyn have been given out to contractors, but when that is done, it is made a part of the agreement that the contractor is to lay the rails but the railroad company welds the joints.

Instead of doing only 390 joints, which was the record for the first year, the average per year since then has been over 1,500, the respective numbers being as follows: 1911, 390; 1912, 1,092; 1913, 1,641; 1914, 3,124; 1915, 1,925; 1916, 2,898; 1917, 2,195; 1918, 1,179; 1919, 628; 1920, 0; and 1921, 604.

The number of joints installed in the last few years would have been much greater if the company had been able to obtain, first, the labor necessary for laying track as easily as was done before the outbreak of the war and, later, the money to purchase both labor and material.

The welding process is as follows: After the roadbed and ties have been placed the rails are laid and temporarily spliced, the abutting ends being connected to each other by splice bars with two bolts in each end. The holes for the bolts are 2½ and 6½ in. from the rail ends. When the rails are to be welded the plates are removed and the special pins previously described are driven into the bolt holes. The ends of the rails are then cleaned with a sand blast and the molds are placed in position. These molds consist of three pieces, one for each side and one for the top, although the top piece is not used in shaping the weld but merely to act as a brace to prevent the rail humping at the joint due to the expansion in the ends of the rails caused by the heat of the weld and also to supply additional radiating surface so as to keep the head of the rail as cool as possible. Before the molds are placed in position they are carefully dried and the inside surfaces oiled. The two side pieces are then put in place and held there with "C" clamps. The top piece is then applied and held down tightly to the rail by hooked straps passing under the base as shown in the illustrations.

The next step is to preheat the molds so as to prevent their chilling the metal poured into them. This is done with a kerosene burner, after which the molds are banked with dirt. In order to keep out this dirt or any other foreign substance which might fall into the molds the openings are covered with pieces of paper which are weighted down with stones to prevent their being blown away.

POURING THE JOINT

This work is all done in the morning after the rush hour is over, when it is possible for the passenger cars to single-track past the section being cast welded by means of portable crossovers placed at each end of the section. About noon the joints are ready for pouring and then the welding car is run into the middle of the section and the ladlefuls of hot metal are carried out from it in both directions. The fire in the cupola has been lighted before leaving the yard in the morning so that only a few minutes elapse between the time that the blast is started and the metal is ready to pour.

The pouring ordinarily consumes from an hour to an hour and a half so that there is ample time for the joints to cool and the molds to be removed before the evening rush hour, which generally commences about 4:30 p.m. The joints are placed opposite to each other so that if any humping of the track should occur, due to the expansion of the rails, it would occur at only half as many points as it would if the joints were staggered. This humping, however, has been hardly ever noticed and is caused only when the top clamps have not been tightened up sufficiently.

There has been no trouble experienced due to the softening of the head of the rail, although to prevent this the casting is not made heavy near the top. On account of this precaution and also due to the ability of the top piece of the mold to conduct away the heat, it is possible for a man to place his hand upon the head of the rail close to the joint without danger.

The metal used for pouring consists of 60 per cent pig iron and 40 per cent scrap iron. Each joint requires 200 lb. of metal or 120 lb. of pig and 80 lb. of scrap iron, to which is added ⅓ lb. of titanium alloy. The scrap iron is made up mostly of broken machinery but the pig iron is purchased under specifications calling for: Silicon, from 2¾ to 3½ per cent; sulphur, not over 0.03 per cent; manganese, not over ½ per cent, and phosphorus, from 0.6 to 0.8 per cent. .

The estimated weight of metal for each completed joint is 176 lb., so that about 12 per cent of the 200 lb. required to be melted in the cupola for each joint is lost as either slag or waste in pouring. A special rest for the ladle consisting of two upright wooden posts with lugs on which to rest the handle is used and permits of pouring slowly, without spilling.

After the joint has been poured and the molds have been removed after the metal has cooled, the top of the ends of the rails is filed with a heavy file drawn by two men, so as to make the joint perfectly smooth and leave no possibility of one rail end being slightly higher than the other.

While almost all of the work in Brooklyn has been confined to girder rail in paved streets, yet a little has been done on exposed tee rail and with perfectly satisfactory results. In the paved streets the rails are held to gage by tie rods and also by the pavement, so that there is no possibility of their being affected by expansion in hot weather. The tee rail, however, has not these safeguards, so that allowance has to be made for expansion and contraction. This is done by welding the rail in sections of about one thousand feet and then cutting in slip joints made of switch points at the ends of these sections, thus permitting of sufficient sliding action to compensate for the alterations in the length of the rail due to the changes in temperature.

Not only are the joints satisfactory physically as connections between and supports to the ends of the rail, but electrically they furnish a connection which cannot be duplicated by bonds and one which is permanent and does not deteriorate with years of service as do bonds. As a proof of the unchanging electrical resistance of the joints it is only necessary to quote the results of tests made on 8,172 joints welded in the years 1911 to 1915 inclusive and tested once in 1916 and again in 1918, as below:

Year Welded	No. of Joints	Resistance in Feet of Rail	
		1916	1918
1911	390	4.01	4.07
1912	1,092	3.64	3.60
1913	1,641	3.86	3.83
1914	3,124	3.78	3.85
1915	1,925	3.50	3.59

While there is a slight increase in the resistances measured in 1918 over those in 1916, yet it is exceedingly slight, an average for all of the joints showing only 0.04 ft. of rail or ½ in. increase in the equivalent length of rail. Even this increase may not have been exactly correct as the tests were, of course, not made under laboratory conditions but in the field with bond testers of ordinary accuracy and with which it was difficult to read to fine divisions of a foot.

The cost of a cast weld is but little more than that of a welded joint and the results are much superior. When the cost of bonding, even to a smaller conductance, is taken into account it is easy to see that the weld has made good and that there is ample reason for standardizing upon it on this property.

What Was Done at the Convention of the Claims Association

By Cecil G. Rice

Past-President American Electric Railway Claims Association
and Manager Associated Bureaus, Receivers
of Pittsburgh Railways

DISTINCTLY progressive, definitely constructive and co-operatively harmonious features were recorded in the Chicago convention of the American Electric Railway Claims Association. Positive action tending further to broaden and develop the work of the organization was officially adopted.

Acknowledged to have been the most successful claims conference ever held, it also ranked high in importance in comparison with sessions of the affiliated associations. Hereafter the Claims Association must be more seriously considered in the counsels of the parent association as to members, objects and accomplishment.

CECIL G. RICE
Retiring President
Claims Association

The action of greatest fundamental importance was the unanimous adoption of new objects of the association. As finally approved they record broad purposes, openly declared and strikingly phrased. The new paragraph of the constitution not only brings up to date all that the more advanced departments are doing but sets a goal for further revision and achievement, and co-ordinates the best interests of claim departments with the ultimate best interests of their companies as well. By this constitutional revision the Claims Association takes a step in advance of any similar organization. The new objects are:

> The objects of this association shall be to endeavor through co-operation, study and discussion to ascertain, inaugurate, maintain and develop those modes of procedure, practices, policies and ethics most effective in preventing accidents, determining and discouraging unreasonable claims, minimizing inequitable expenditures and other waste, defending against unfair demands, adjusting claims owed and otherwise advancing the ultimate best interests of member companies and those they serve.

Heretofore the interests of claims departments, the legal and medical branches, other departments and the company generally were unnecessarily but unfortunately considered more or less separately. With the new objects carried out the Claims Association becomes a forum where all these elements are to be considered. No one informed of the facts will doubt the decided mutual advantage which will result from such co-operative counsel.

Second only to the adoption of the objects, because its full accomplishment awaits the 1923 convention, is the consideration of a Code of Ethics. At my urgent solicitation, Russell A. Sears, general claims attorney of the Boston Elevated Railway, prepared such an outline. When it was reached on the program it had become necessary for several members to leave to make trains and Mr. Sears recorded his approval of such an adoption but considerately asked that the president appoint a committee to report next year, when the code can receive the approval of the full membership. When the code is made a part of its guiding literature the Claims Association will join the group of professions and businesses whose objects and ethics are permanently recorded. Influence and prestige will follow. The mystery surrounding claims will vanish. Understanding and business principles will overcome odium and prejudice.

An accomplishment of great future benefit, if encouraged and developed, was the establishment of co-operative relations with five other national organizations having similar interests or otherwise directly affected. Consideration of the indefensible and receipts wasting influence of "ambulance chasing" and exorbitant contingent fees of attorneys and doctors was vitalized by messages from the presidents of the American Bar Association, the American Medical Association and the National Electric Light Association. Present to lend encouragement were R. H. Doolittle, president; R. C. Greene, past-president; H. D. Morris, secretary, and J. C. Rose, member of the executive committee, of the Association of Railway Claim Agents, composed of the steam railroads, and H. R. Harrold, chairman of the executive committee of the International Claims Association, composed of insurance companies. Two territory organizations also were represented by C. M. McRoberts of Los Angeles, president Pacific Claims Agents' Association, and W. C. Swisher of Kansas City, president of the Mid-West Claims Association.

The foundation for action tending to control this rapidly increasing evil was laid in two papers recording the practices which prevail and two learned addresses analyzing the legal effect and aspects. The studied address by A. E. Powell, of Squires, Sanders & Dempsey, attorneys-at-law, of Cleveland, was a literary effort of much practical value. To this was added a symposium stating the experience of attorneys from various parts of the country in reducing and controlling these crimes locally. A detailed survey of methods found effective, with recommendations for local adoption, supported by the several associations probably will result from the work of the committee whose appointment was authorized by resolution.

Deferred reference is made to the subject of safety only because its importance and actual necessity are generally recognized, the only debatable point being the methods to be adopted to fit particular conditions. Public and company organizations and general but unorganized methods were described, followed by a recital of the actual results in claims cost reduction of various companies.

A resolution formally approving the principle and practices of accident prevention was adopted. The operating phase of the subject was discussed and the work of the Transportation & Traffic Association was described, the report of its safety committee being distributed. The same object is sought by both organizations and no conflict is possible.

The prevention, investigation, adjustment and defense of automobile accidents and claims were treated in ten especially worthy papers describing practices employed in the North, East, South and West by both large and small companies. These fine papers are of distinct value to any one who wishes to be fully informed in relation to the subject, and it is found that from 40 to 75 per cent of traction accidents involve motor vehicles in the larger cities. The appointment of a committee to conduct further research was authorized by resolution.

The medical defense of litigated claims is a much used and abused procedure employed wherever claims occur. The learned contribution by Dr. John Leeming, medical counsel of the Chicago Surface Lines, constitutes a text book of information that has a practical value not possible to estimate. The same subject was also treated from the trial attorney's point of view.

The question of women jurors was but briefly referred to. It appears that the calling of women to pass upon damage cases is not yet so generally in use as to afford deductions of value. Where ambulance chasing is developed, jurors friendly to them or their attorneys find their way into the wheel. It is generally believed that the danger of women having such relations is less. A contribution of much value to attorneys was a digest of the jury laws of the various states.

That claims work is a dignified profession demanding rare and exacting attributes was thoroughly presented by J. R. Guilliams, general attorney of the Chicago Surface Lines, probably the largest organization of its kind in the world.

That the requirements for claims directors have changed and that a claims executive who develops policies and systems in one city proves his fitness for developing his professions in another city was made clear.

That the title claim agent carries an undeserved odium, aids in encouraging claims and handicaps active participation in accident prevention—now the first duty of a progressive claims man—was developed.

That acts of management and operation directly affect claims and verdicts may have presented a new thought for many executives.

That a budgetary procedure for governing claims expenditures offers advantages to the claims director as well as the management was a new subject.

It was declared and its truth accepted that claims men, as a class, have not received the recognition to which their ability and knowledge of human relations entitle them, that their value to their company may have been lost sight of in the trend toward newer management features and that the pay of investigators and adjusters often was less than that of conductors and motormen, although the work of these men is probably the most exacting of any within the industry. These facts present thoughts for fair-minded executives to investigate.

No man is too big for claims work. He should be paid what it is worth. The survival of the fittest applies as fully as in other lines of endeavor.

The attendance, despite most trying and unfavorable weather conditions, broke all previous records. Every section of the country was represented. The Pacific Coast sent several representatives. A notable feature was that some twenty-five of those present had never before attended a convention. Comprised in the registration was a large group of attorneys, doctors and company executives. Serious attention was given to the papers and addresses. Discussion was developed in groups after the sessions. Twenty-eight subjects were treated by an authority with some forty-five papers and addresses. Out of all this number there was but one failure to be present or send a paper.

A carefully arranged display of framed cartoons, safety indorsements and charts, a large detailed organization chart and graphic charts showing the studied results of 350 court trials, provided by the Associated Bureaus of the receivers of the Pittsburgh Railways, attracted lasting attention. The same bureaus presented a "Book 'o Smiles," being a collection of jokes relating to litigation, claims and transportation, in each of which may be found a quiet suggestion against unreasonable claims.

The convention was opened by a prayer and invocation. During the entire twelve hours but one story was told.

Perhaps no better indication of the benefit derived from the convention can be had than through the following extract from one of perhaps a hundred letters received by me before and since the convention, the writer being the general manager of a Mid-West property:

> I wish to express to you my appreciation of the splendid program you succeeded in working out—no doubt requiring months of time and study—and I am convinced that all the members present feel as I do; amply repaid for the time and money spent in attending the convention. This is the first convention of the kind I have attended. If I can put even a small part of what I learned into actual practice on the property of which I am manager my company will have profited by the expense of the trip.

I am convinced that the Claims Association offers unlimited possibilities for the advancement and betterment of the claims men and the companies they serve. The need is for a greater development of an association spirit which will subject every act to the one test:

"What is for the best interests of the Claims Association?"

Those executives and others who avail themselves of the opportunity of reading and digesting the proceedings of this convention in conjunction with the information and enthusiasm absorbed by their representative in attendance will learn that the real value derived—immediate and future, practical and theoretical, relating to claims and to the company generally—is the best investment ever made on a basis of the insignificant expense of attendance.

The personnel of the new officers seems to assure that the harmony, interest and co-operation now existing will be nurtured and developed.

Next year's convention can be made better. Let's prepare now. See that your "boss" has his attention called to what you did this year.

Steam Engine Statistics

ACCORDING to recent statistics of the Census Bureau, relating to the manufacture of engines, there were 19,427 steam engines built in the United States during 1919 as compared with 14,664 in 1914. The horsepower capacity figures are: for 1919 7,244,337, as against 2,192,079, or an increase of 230½ per cent. At the same time the value of the product increased from $21,784,109 to $101,952,707, or 368 per cent. The figures include both reciprocating engines and turbines.

Proceedings at the Claims Convention

Accident Reduction Stood Out as the Salient Feature of the Program, with Special Reference to the Automobile Hazard—The Effects of This Work on Claims Were Shown to Be Striking —Wallace Muir, Lexington, Ky., Was Elected President

THE first session of the nineteenth annual convention of the American Electric Railway Claims Association was called to order at Claims Hall, Municipal Pier, Chicago, at 2:30 p.m., Oct. 2, by President Cecil G. Rice. Prayer was offered by Doctor James S. Stone, director of St. James Episcopal Church. At the close of the invocation, Augustus Baker, on behalf of the Associated Bureaus, Pittsburgh Railways, presented Mr. Rice with a gavel. The gavel was inscribed with the name and title of Mr. Rice and bore testimony to the "appreciation of his unfaltering loyalty to ideals, policies and principles which have made for the national advancement of accident prevention and claims organizations and the best interests of our companies, our associated bureaus and ourselves." Mr. Rice expressed his appreciation of the gift.

President Rice then explained that he had just come from a hospital bed and would ask Mr. Hellmuth to read his presidential address. It follows, in part:

PRESIDENTIAL ADDRESS

I have very definite ideas as to the work our association should now undertake, but they will be withheld for my successor, should he care to receive them. My proper task now is to direct your minds to the immediate present.

We who are here form an industry group upon whose judgment $50,000,000 is annually paid out for injuries, damages and expenses. This sum indicates the immensity and the importance of the work in which we are engaged. Grouped here it is easier to visualize our relative position in the business, professional and social world.

Everything which affects the human being bears directly or indirectly upon our work. We are specialists in human nature, expert buyers of a variable and changing commodity. We fight that deception and greed which are so inherent and developed in man. We must be just and equitable while others seek to take advantage of us. We endeavor to compensate for life which cannot be replaced, and for pain and suffering which cannot be removed. I have yet to find an executive with a theoretical and practical understanding of claims work who has not been a claims man.

Is it not true that conductors and motormen are paid more than some of those who investigate and settle claims; that safety supervisors in industry draw salaries two and three times as high as the average claims director; that one contingent fee collected by but one of the many legal wolves against whom we battle exceeds our pay per year, possibly? Whose fault is this?

WALLACE MUIR
President Claims Association
1922-1923

We have met, we have discussed, we have raised the efficiency of our department. But what have we developed by research? What standard form of practice have we adopted? What outstanding thing have we done as an association to raise and broaden our group sphere of usefulness and respect?

What can we do? We can increase the efficiency of our departments, more fully co-operate with other departments, overcome prejudice and inspire confidence, grasp and develop the newer, higher and most profitable claims complement, the prevention of accident. Then we can sell our association our work, our department and ourselves. We need and must develop an association spirit. Let the test of our actions be what is for the best interests of the American Electric Railway Claims Association.

At the completion of President Rice's address a letter was read from M. B. Starring, president United Railways Investment Company, extending his best wishes to the association and hoping that the meeting would be an unqualified success.

The first speaker of the day was J. R. Guilliams, general attorney Chicago Surface Lines, who spoke on the subject "The Dignity and Fundamentals of Claims Work." After welcoming the delegates to Chicago, Mr. Guilliams read the paper, of which an abstract follows:

FUNDAMENTALS AND DIGNITY OF CLAIMS WORK

Figures for 1920 show the amount of money then invested in the four principal utilities in the United States as follows:

Electrical	$4,800,000,000
Electric railways	4,500,000,000
Gas	3,700,000,000
Telephone	2,000,000,000

While all of these utilities are engaged in hazardous business, that of the surface railways is the most hazardous. During the morning and evening rush hours, a majority of the railway passengers are in a hurry to board the first car, and they are usually in just as great a hurry to alight from the car, so it is easy to understand how many accidents occur. The annual cost of accidents in all lines of industry and business in the United States is now $1,500,000,000 and $50,000,000 is the annual accident loss maintained by the electric transportation lines alone. Almost every large industry in the United States, particularly every large public utility industry, has its claims department, and while I am an urgent advocate of safety work, I believe that well organized public utility claims departments will be necessary until the millennium arrives.

The code of ethics which should be adopted and maintained by a claims department is the same as that which should be adopted and maintained in the conduct of every other honorable business, and that should be "A square deal for every one from every one." Employment of trickery, dishonesty or unscrupulous methods cannot be thought of. Every claims director or agent or other employee in the department who in spirit or action is not in accord with these principles should be discharged. A claims director or agent can have no foundation on which to act in disposing of a claim until he is in possession of the facts, so far as reasonably they can be obtained.

In street railway claims the first information, as a rule, is the report made by the train crew and other employees. Under our system these reports are delivered to the claims department before 3 a.m. on the following day, when several copies, including the names and addresses of witnesses and of the injured, are made before 8 a.m. The chief investigator, when he arrives at the office, reads these reports, passes judgment on the importance of each and indicates what attention shall be given to it. A file is made of those deemed inconsequential, and no further attention is given to them unless a claim is filed. For those determined to be of minor consequence a written request is sent through the mails to each witness, asking for a statement of the facts. Our experience shows that about 35 per cent of the inquiries sent out are answered, while of the statements sought through investigators, 75 per cent are secured. The other 25 per cent are accounted for by failures to locate or refusals to make statements.

In the more important cases direct investigation is followed. In such cases the chief investigator decides whether an inspection of the car track or paving, a photograph of the car or other vehicle, a plat of the situation, or a vicinity investigation shall be made. The original and one copy of the accident report are then placed in the file. One copy goes to the general claim agent, another to the chief investigator, another to the superintendent of transportation, and another to the investigator for his information.

In the letter used in making investigations through the mail, a stamped envelope is inclosed. The letter requests the witness to give all the facts, and the reverse side contains ten questions which are deemed pertinent for the purpose of eliciting the necessary information. One of these invites the witness to tell in his own way how the accident happened. The work of the adjuster includes the interviewing of the injured and the doctor, and at the appropriate time, the obtaining of a written, and if possible a signed, statement from the injured, covering his knowledge of the facts involved. Adjusters do not make calls on the injured before a claim is presented, except in those instances where the information in the possession of the department indicates quite clearly that a claim will in all probability be presented and where the injuries are apparently serious.

In those matters deemed serious by the train crews, they are required to inform the claims department immediately by phone of the accident, giving as full information as the circumstances require. Where the department is in doubt as to whether the individual sustained injuries of serious consequence, a quiet investigation is made for the purpose of determining this fact.

Where the liability is clear, the claim should always be settled promptly. Where a difference of opinion honestly exists as to liability, settlement is usually justified if made on a compromise basis. Where the case is "blind," that is where no report has been made by train crew or other employees, compromise is not usually desirable unless the claim agent is satisfied that the claim is meritorious. Where liability should be denied, no compromise is made, whether the injury is serious or slight.

The difficulty of course is to determine the class and also what is considered a reasonable figure. In the first class of case mentioned, when the claim agent has fixed in his own mind what he considers a fair figure, it devolves upon him to satisfy the claimant on this point. Largely the same conditions prevail in the second class of case mentioned. With "blind" cases, it is our policy to insist upon full disclosure from the claimant, and if it appears probable that the accident or injury occurred as claimed, we try to compromise the claim upon fair terms. If, however, the claimant refuses to make the disclosure, we have no hesitancy in permitting the claim to go to suit. My experience is that juries as a rule are not kindly disposed toward "blind" cases. The non-liability cases call into play, on the part of the claim agent, a clear appreciation of what in law is required by both the company and the claimant.

We have a well qualified surgeon who is in the headquarters of the company during the entire forenoon of each day and is provided with the necessary equipment for minor surgical work and treatment to care for those injured who are willing to come to the office. This surgeon also makes an examination of any claimant, when this is desirable, and he consults with the general claim agent as to just what should be done surgically or otherwise. The Chicago Surface Lines also has, in its general office building, a medical department which does work for the claims department when requested and advises on cases, particularly when there are any unusual features. The claim agent also consults with the legal department almost daily.

The claims department also co-operates with the other departments, and in every case of accident the chief of the department responsible for the accident receives a copy of the report of the accident, and at the end of each week he receives a report from the claims department, stating its conclusions with reference to where the blame should be placed. The claims department weekly also furnishes the superintendent of transportation with a statement showing the number of accidents for the week, divided into ten classifications.

At the conclusion of this address, President Rice announced that the next would be by P. O. Solon, claims attorney San Francisco-Oakland Terminal Railways. An abstract follows:

MINIMIZING EXPENDITURES THROUGH CO-OPERATION OF TRAINMEN IN OBTAINING OBSERVERS

The street railway should do everything within its power to furnish its trial attorney with as many favorable witnesses as possible. As a class, trainmen do not make intelligent witnesses, and when cross-questioned by clever attorneys for the plaintiff they can easily be confused, bewildered and caused to lose their temper when on the witness stand. A railway defending an action for damages with no disinterested witnesses to testify in its favor is usually as a sheep being led to the slaughter house. It is in the favorable testimony of disinterested observers that lies the street railway defendant's greatest hope of convincing the jury in a proper case. The company with which the writer is connected recently asked its trainmen the following questions in regard to witnesses in accident cases:

Do you pick out anybody in particular for the first one you will ask to sign a card? If so, whom do you pick?

When you hand a card to a passenger or bystander to get name and address, just what do you say? (Write the words you would use.)

Do you always first ask if the party you are speaking to saw what happened?

If the party says, "I didn't see the accident," then what do you say?

What do you say to people who don't sign because they do not want to get mixed up in it?

Is a passenger who does not see what happened in an accident of any use as a witness? If so, why?

If an accident occurs and you have no passengers, what do you do as a rule in trying to get names of witnesses?

If car is crowded and a woman is hurt in a step accident, about how many names do you think you should get?

What is the most difficult situation you have to deal with in getting names and what do you think is the best way to overcome the difficulty?

What method in getting names have you found best?

Write further remarks, and ask any questions on this subject you would like to have answered.

More than 1,200 questionnaires were filled out, and if any claim agent or claim attorney thinks he is well informed upon the difficulties that attend the efforts of car men to secure the names and addresses of persons, he should read the answers given and he would conclude that while a large percentage of our men are evidently in need of individual instruction, many others have intelligent methods of getting passengers and bystanders to "sign up." The best of all the answers have been compiled, and in the course of the next month it is expected they will be printed in a small book, wherein will be printed the merits and demerits of the answers. A copy of one of these books, with a letter of commendation and criticism upon the answers he personally gave, will be sent to each platform man.

The next address was by H. O. Allison of the Beaver Valley Traction Company on "Personnel Specifications for Modern Claims Men." An abstract follows:

PERSONNEL SPECIFICATIONS FOR MODERN CLAIMS MEN

Claims work is a profession, a science demanding as profound study as the profession of the lawyer or the physician, the science of chemistry, bacteriology, or etymology. There are no books for guidance. The essentials must be acquired and retained within the mental storehouse. Each new day opens up its share of problems, as different from those of the day previous as night is from day. In recent days we have heard much of psychology. Those who have been in claims work for ten or fifteen years practice it daily. Probably they did not know it by that name, but their remaining in this work shows an understanding of human nature still beyond grasp of many accredited psychologists. An academic study of man discloses frailties, vanities, ambitions and desires of a greater or less degree in every specimen. It is with this complexity that the claims men deal.

This is a profession which can be practiced in any city or state. A man trained in Pittsburgh can do equally as well in San Francisco, Chicago, Cleveland or Dallas. The specifications of a claims man should not be whether he is a native, an experienced transportation man, a lawyer, a "good fellow" or a member of many fraternal orders. The successful modern claims man is one who decreases claims in a field of rising hazards; one who, when a liability occurs, makes an adjustment equally just to the claimant and the company he represents, who conducts his business with the least aid of courts and juries, who reduces the number of claims and amount of expenditures made through prevention of those occurrences which prompt claims.

An educational broadening of the mental grasp, supplemented by a practical worldly experience is a desirable personal specification for those entering claims work. From that point, progress is only by ability, increasing as experience becomes more general. There must be a thorough study of accident causes, the human element and its equation, and the nature of the animal known as man. Absolute honesty is an indispensable attribute, as sharp practices resulting from misunderstood covenants have no place in claims work. Some of those entering this work may become good investigators but poor adjusters. The ideal entrant is the man who can do both equally well, and as he progresses in both, the foundation is laid for a future head of the department.

At the conclusion of Mr. Allison's address, President Rice said that there has been some consideration in the past few years as to whether the title of claim attorney or claim agent was not a hindrance to the work, that it, in a sense, encouraged claims by the use of that title, particularly so when inquiries were sent out that called for replies. Some companies have changed the title. One of these is the Cleveland Railway, and the head of its department is called "Superintendent of the Accident Department." He then announced that W. F. Weh, who held that office with the Cleveland Railway, would next address the meeting. An abstract of his address follows:

THE TITLE "CLAIM AGENT" PERSISTS

The speaker said that he had no decided opinions for or against the word "claim" or the title "claim agent" and naturally had a feeling of disinclination to argue in favor of anything which appeared to be more or less technical rather than practical. The change mentioned in the Cleveland department was made some six years ago, but while some benefit has undoubtedly resulted from it, statistics did not show any decrease in the number of claims as the result of this change. On the contrary claims of every nature have increased. Moreover, after six years of educational effort by the sixty-five people connected with the department, in addition to the wide circulation of letterheads and other printed material, the Cleveland public and those with whom the department does considerable business persist in speaking of the "claim department" and "claim agent."

Nevertheless every effort to suppress suggestions which encourage the making of claims is laudable. The word "claim" also has no place in accident prevention, and every one engaged in such a work should exercise the greatest care to avoid using the word or any reference to it. The following points stand out as against the use of the term:

First, the word "claim" stands for money to many minds, and may be highly misleading. It should be impressed on everybody that the accident department functions to ascertain the facts of an accident and has been created to deal impartially with every person who presents a legitimate loss.

Second, in many cases where grave doubt exists as to serious injury or the company's responsibility, investigation may quietly be made, but if an investigator announces to the injured person that he represents the "claim department" a different situation develops, and the idea of securing damages from the company is immediately suggested, so that the exact nature of the injury may not be disclosed until the trial.

At the conclusion of this address the president introduced J. W. Giltner, chief claim agent Northern Ohio Traction & Light Company, Akron, Ohio. An abstract of his address follows:

ACTS OF MANAGEMENT IN OPERATION WHICH AFFECT CLAIMS

A few years ago the number of personal injury and property damage claims on electric railways was comparatively insignificant. In many of the smaller companies a highly developed and efficiently organized claim department was practically unknown, and the officials of the company adjusted the most important losses for sums it would now be considered ridiculously small. Let us hope that the pendulum will again swing back.

If we would enjoy a favorable public opinion and thereby overcome prejudice we must command it by service to the public. Let it be granted that the management, by its policies toward employees, has secured from them the highest efficiency. Then it must, with as great care, secure and maintain equipment possessing the minimum of hazard. Birney safety cars and those of the Peter Witt type have greatly reduced the number of step accidents but have introduced a new type, that of passengers being caught in the doors, and it is possible that still further improvements could be made by reducing the amount of open floor space, by providing a more dependable door control and by inside stationary steps instead of outside movable ones. Good maintenance also is essential as a price of maximum safety, nor should the training and discipline of the platform men be forgotten. In fact, no other element in the operation of the street or interurban railway will minimize the number of accidents and therefore claims as will careful selection of men and their just discipline.

A paper on "Budgetary Procedure in Claims Expenditure" by John J. Reynolds of the Boston Elevated Railway was then presented. This was followed by an address on the psychology of a smile by Augustus Baker of the Associated Bureaus at Pittsburgh. Abstracts follow:

BUDGETRY PROCEDURE

The paper on this subject by John J. Reynolds, claim attorney Boston Elevated Railway, was one largely telling of the advantages of a budget for the claims department and answering objections to it. He said that in the first place the term "budget" was not exactly correct, because that word, in its strictest sense, implies careful estimates of both expenditure needs and probable income, while the budget for the claims department is principally on expenditures. In its preparation it is of course impossible to fix absolutely in advance of actual settlement the cost of accidents, but it is possible to estimate them, and the entire expenditure should not be made too low, as otherwise the claims executive may be deceived as to his real financial possession.

Obviously there should be some flexibility in the budget to take care of catastrophes or extraordinary happenings. Thus interpreted a budget is almost synonymous with efficiency, economy and lower costs. Care should be taken, however, not to defer payments due or those which if made will close a case economically and promptly. The budget also should not be considered absolutely inflexible and unchangeable, but if one is adopted, those responsible for its expenditures should keep advised of the amounts paid out and thus be better able to give valid reasons for unusual disbursements.

THE PSYCHOLOGY OF A SMILE

According to Mr. Baker, with all the changes which have come over the world in modern times, the people of today are swayed by the same impulses and emotions as were those who lived in the time of Aristotle, who, it is said, wrote the first books on psychology. Psychology has been defined successively as the science of the soul, of the mind, of consciousness and of behavior. Actually, it seems a study of actions. Students of psychology are unable to tell us what causes the smile, but it is the leaven of mankind, which is universally understood. That a pleasant address, a cordiality in greeting, a frank, sincere and smiling countenance is an asset, there can be no doubt. It begets civility, good fellowship, courtesy and forbearance. It makes for sanity and safety. It is the antithesis of anger, an outward indication of our mental equilibrium. In business, in the workshop, in the church, in the court, wherever mankind may congregate, the opportuntiy to smile is always welcomed. Mr. Reynolds of the Boston Elevated Railway has said:

> It is very clear to me how important in the successful prosecution of claim work a smile is. I have yet to learn why more claims men do not cultivate and capitalize it. This may be done and still have the right sincerity, purposefulness, seriousness. earnestness and determination underneath. A smile keeps one in good spirits and it drives the frown from other faces too. It acts like sunshine, warming and brightening all it falls upon. It certainly will do no harm to remind claims men that in the ordinary man there is a disposition to playfulness, to smile. It is defective character to have no disposition for either in one's making. The successful claims man knows exactly when and how to smile and to be funny, and when and where to stop. There is little enough of play in the life of a busy claims man. Indeed, it is a very serious work, but on account of his very seriousness, we require some play to set it off. Many a difficult situation, many a

troublesome case becomes easier by the proper blend of a cheerful smile and earnestness. The day has gone when a proud, stern, severe, mirthless and smileless man should ever hope to be a successful claims man. A depressing solemnity and cheerlessness will never minimize accident costs.

After Mr. Baker had concluded his address, Mr. Rice announced that the association had secured copies of a variety of forms used in the claims departments of different companies. The meeting then adjourned for the day.

Tuesday Afternoon Session

Outstanding Features Were Two Symposiums, Respectively Dealing with the Effect Upon Claims of Accident Prevention and Automobile Accidents and the Consequent Claims—The General Subject of Accident Prevention Was Also Discussed

THE session on Tuesday afternoon opened with a talk on safety by W. H. Boyce, chairman of the T. & T. Association's committee on safety. He described the safety exhibit on the pier, which occupied seven sections, or 140 running feet of space, and displayed 1,100 sq.ft. of safety material.

President Rice then gave an introductory talk on the subject of safety, which, he said, is, or will be, the most important feature of claims work. "While we shall always have claims," he said, "it must be remembered that when accidents are prevented, claims are prevented. If 5 per cent of the money now paid out for claims was intelligently used in connection with accident prevention, it would produce a greater return than any other expenditure of a similar amount in the electric railway industry."

Referring to the results of safety work in Allegheny County, Pa., Mr. Rice said that the activities which have developed accident prevention have reduced fatal accidents over 50 per cent. On the traction lines, for instance, the number was reduced from ninety-three to thirty, the lowest in the history of the coroner's office. The president of the Yellow Cab Company stated that, as a result of the work, accidents had been reduced 85 per cent, and the casualty insurance premium of the company $12,000. Fares were reduced on account of this saving.

Mr. Rice stated further that a safety award made to the industrial plant in western Pennsylvania making the best safety record went to the H. H. Robertson Company, which operated 280,000 hours with 134 men without loss of time through accidents. The American Steel & Wire Company had only 244 hours lost time with 700 men working more than 2,000,000 hours. In the twelve counties comprising the western Pennsylvania division, the decrease in workmen's compensation in one year was in excess of $500,000.

The accident prevention work, in Mr. Rice's opinion, should be done by the claims men, but such work cannot be done by anyone under the title of "claim agent." It cannot be done by the company alone, but is a specialty. The highest man in connection with the company must actively support this work and have it radiate from him to the men on the job. He advised working through the local safety council organization because many organizations are active in this and the work is not advertised as coming from the railway company, which might rouse a certain prejudice.

Mr. Rice referred to the interview with him published in the issue of the *Electric Railway Journal* for July 22 as voicing his views on this subject. He also mentioned the safety epigrams in the issue of Sept. 9.

He then explained that the discussion would cover the four phases of this work, namely, organizing a local safety council, organizing the company's own employees for safety, preventing accident work without either of these special organizations, and results of accident prevention work. He called on B. W. Frauenthal, St. Louis, to read a paper by C. B. Hardin, St. Louis, Mo., which is abstracted below.

LOCAL SAFETY ORGANIZATIONS

In this paper Charles B. Hardin, United Railways of St. Louis, divided the subject into: Industrial safety, school safety and public safety, which he said might be referred to as traffic safety. Usually the first step in a campaign for community safety is a program on industrial safety, and this movement naturally extends to the other two branches. Preferably industrial safety should be conducted under a local safety council rather than to have the work undertaken individually by the various industries. School safety can be promoted without a great deal of expense through the industrial safety committee, as in a great majority of cities the membership of the school boards include several prominent industrial men. A desirable plan is to hold a local meeting of the school authorities and have some outstanding person, prominent in the promotion of school safety work, address the meeting.

Public safety includes both street safety and home hazards. Much can be done in the correction of fundamental causes of street accidents by the installation of safety zones, parking districts, proper lighting arrangements, etc. In St. Louis the Safety Council maintains a public safety engineer who gives his full time to the correction of physical hazards and has the authority of an officer of the law. The second part of public safety work is educational propaganda plus law enforcement.

The speaker listed the means of organizing a local safety council as follows: (1) Appoint a local committee of five persons to arrange for the organization; (2) call a meeting of the members of the National Safety Council in the territory concerned and lay before them a definite program of industrial safety work for their consideration and approval; (3) elect an executive committee composed of leading industrial men, arrange for weekly meetings and employ a secretary-manager; (4) organize school safety with the help of local and national school safety experts; (5) adopt a program of public safety, include in the personnel of the public safety committee representatives of all civic clubs and organizations and have monthly meetings; (6) enlarge the staff as necessary, as it is better to start with a small organization and build up than attempt too much and fail; (7) call on the National Safety Council officials for assistance and the help of experts on public and industrial safety and local organization.

The speaker outlined the organization of the St. Louis local council. The revenue is $24,500 a year. The principal contributors are factories, that pay local dues of 10 cents per employee, public utility companies, which pay 1 per cent of the net claims paid out for public accidents, and associations, which are assessed 5 or 10 per cent of their aggregate insurance coverage premiums. The council also has a membership of business firms and industries that pay dues of $10 a year and individuals who pay $1 a year. The results in St. Louis have been satisfactory.

By way of discussion of Mr. Hardin's paper, Mr. Rice said that in the United States there are some thirty cities having local safety councils with paid secretaries and organized as locals under the National Safety Council. St. Louis has probably the largest and strongest of these councils, and Mr. Hardin speaks with authority because he has been active in the St. Louis work and was formerly president of the local council.

Reinforcing some of Mr. Hardin's points, Mr. Rice said that in Pittsburgh the idea of safety had been sold to 150 supervisors and principals in the public schools, to 200 teachers in parochial schools and some forty principals of county schools. Indorsement was also secured from the state superintendent of public instruction, and accident prevention is now taught under a state law. The Governor has also highly indorsed the safety work, and an indorsement given by President Harding to the National Safety Council has also been utilized.

"When accident prevention is taught in the schools," said Mr. Rice, "there is reduction of from 6 to 15 per cent in fatal accidents. The greatest work for the future is to be done through the schools. In three years the work that has been carried on in Pittsburgh has resulted in a reduction of 1,500 fatal accidents in Allegheny County with a population of 2,500,000, within fifty-nine of the low record of the county. In Pittsburgh progress has been made in organizing a Safe Drivers' Club which is now putting on a membership campaign to raise $50,000."

Mr. Rice then pointed out that while his activities in this work have been as an individual and not as a representative of his company, the company is getting benefit from the fact that men trained in safety in other employments are naturally better employees when they secure work with the railway. He then called on Victor T. Noonan, Cleveland, Ohio, to speak on the organization of company employees for accident prevention.

ORGANIZING EMPLOYEES ALONG ACCIDENT PREVENTION LINES

Mr. Noonan said that his work on the Cleveland property, where he is superintendent of the department of accident prevention, is organized in co-operation with the local safety council; the men are organized also, and some work is done independent of all organizations. In the company the organization begins at the top, where there is an executive committee on accident prevention. This consists of the president, the vice-president and other executives to make up a total of seven. Its purpose is to supervise the work and to pass on recommendations regarding safety matters. Every important problem must be brought before the executive committee. The vice-president of the company is the chairman of the executive committee. Then there is a general committee on accident prevention, of which the general manager is chairman. This handles ordinary recommendations which come through the departments. Under this committee there is an operating committee through which the active co-operation of the men is secured. There are also departmental committees, the membership of which is changed every three months.

Twice a month the men make inspections on company time, taking an entire day. Inspections are thorough, including, in the transportation department for example, all of the details of cars which affect safety, the condition of the streets, etc. As a result from Jan. 1 up to Aug. 1 of this year more than 4,000 suggestions were received from the men.

Mr. Noonan said that in addition to the above he holds meetings of the men on company time at which he explains such matters as accident costs, causes of accidents, court procedure in accident cases, the importance of loyalty, courtesy, etc. The general committees are also called together every few months to promote a spirit of unity among the men from the standpoint of accident prevention.

Mr. Noonan deplored the use of the slogan "Safety First," saying that it is not taken seriously. The phrase "Be Careful" is better. It is positive; it tells something; it is one that should stick.

In addition to the committees, said Mr. Noonan, the Cleveland Railway's department of accident prevention has two safety inspectors, and expects to have more. These are employed from 6:30 a.m. to 12:30 a.m., taking turns about. Their duty is to assist the men in keeping the rules, and they make no reports except upon the opening of car doors while cars are in motion. The aim is to impress the men that the department is not doing police or spy duty. The policy is to treat the men fairly and squarely.

Mr. Noonan suggested that as an element in accident prevention everything possible be done to allay the fear of the men regarding the loss of their jobs and the danger of reaching old age without suitable financial provision. He said that he wanted to go farther than mere organization in accident prevention, which is not effective without the human touch. Accident prevention is the work of the good Samaritan in modern life.

ACCIDENT PREVENTION FROM THE PHYSICIAN'S STANDPOINT

Mr. Rice next called upon Dr. Hart E. Fisher, Chicago, to speak on the physician's part in accident prevention. Dr. Fisher began by referring to Mr. Noonan's plea for consideration of the humanitarian side of this work and said that this side also appeals to the physician. From the medical standpoint carelessness is regarded as a mental illness, and reference to certain things which are done by employees as carelessness is sure to antagonize them.

In selecting employees, said Dr. Fisher, it is not enough to pick men who will fit into given positions from the standpoint of the employment officer, but they must be examined by competent medical men. This means physicians who have first-hand knowledge of the kinds of work that the men will have to do.

On the Chicago Elevated Railroads, with which the speaker is connected, the practice is to turn down men with defective vision, because this is a potential cause of accidents. Employees are sometimes discharged for so-called carelessness, when the trouble is simply defective vision. It is not safe to depend upon correction of vision defects by glasses because these may be forgotten or broken. The vision must be good and there must be no color blindness.

Regarding this matter of color blindness, Dr. Fisher said men can sometimes pass the color test even if color blind because they have special ways of determining colors. For example, in signal work the position of a signal is a guide. Sometimes color blind men, by turning the head quickly, can detect the color for an instant.

Again, in transportation work defective hearing is a source of danger. A man in the service with defective hearing may be able to perform his duties by obtaining in other ways the information which ought to come through his sense of hearing. For instance, he may sense the mechanical vibration of a bell without hearing it. He may look out of a window and see that the passengers are all on the car, starting the car without hearing the signal bell. If men are permitted in the service with defects such as this, they should not be called careless if they have accidents.

Dr. Fisher then took up the mental factors which may cause accidents. Among these are grief, anger, mental distress caused by quick temper on the part of superiors. He summarized the situation by saying first that a prospective employee should first be physically competent to fill the position for which he is to be employed; second, after employment frequent medical surveys should be made to detect defects which have developed since the initial examination; third, an employee should be examined again before he returns to work after an injury or a serious illness. Employees should also be trained in first-aid work, not with the idea of making them doctors, but to enable them to care for themselves or an injured fellow employee, in case of an accident, until the physician can be summoned. It is well, also, to have a physician visit the shops and other buildings where men are employed to see if the conditions of temperature, lighting, etc., are conducive to safe work.

Dr. Fisher concluded with some remarks regarding the effect of the work of the claims department on public relations. He pointed out that if claims work is handled right many friends can be made for the railway company. The attitude of the claims department toward the physician is also important on account of his intimate relation with the patrons of the company.

Following Dr. Fisher's address came a symposium on the subject of accident prevention and claims.

Effect Upon Claims of Accident Prevention

Remarkable Results of Consistent and Persistent Educational Work Were Shown by Means of Testimony from a Number of Companies Which Have Taken Hold of Their Opportunities in the Right Spirit

MR. RICE next introduced D. B. Haskins, Chattanooga, Tenn., to open the round table discussion on accident prevention and claims. The substance of his remarks is given below:

REMARKS BY MR. HASKINS

Mr. Haskins started by saying that in this case, as in others, the results are commensurate with the efforts made. Local conditions as to the effect upon claims expenditures of organized accident prevention work affect the showing made on different properties. The real test is a comparison of conditions before such work was started and afterward, when organized accident prevention work has been carried on a sufficient length of time to establish itself.

On the Chattanooga property, for ten years preceding organized accident prevention work, the average yearly cost of the claims department was 12 per cent of the gross passenger revenues. In 1918 it ran as high as 18 per cent, a total of $156,327 for the year. Beginning with 1919, when organized accident prevention was in force, the expenditure was 11½ per cent.

The figure was cut down to 7½ per cent in 1920 and 4.4 per cent in 1921. During 1921 the amount spent for claims was $40,190. The current July report shows expenditures to date for this year of 3.45 per cent.

On May 1, 1918, there were 203 lawsuits pending in court amounting to $1,065,880, and 103 open claims on file. The July, 1922, report shows forty-seven lawsuits pending amounting to $285,450, with six claims outstanding.

Mr. Haskins said that this was not all that the company had accomplished, by any means. The overhead lines, the tracks, the cars and the schedules have all been improved. Good men have been made into better employees and the good will of the public has been cultivated. The claims department is helped by every successful effort in accident-prevention work. He said further that the most important phase of this work is not the financial one, but the humanitarian. This is brought home to one when an accident occurs within his own circle of acquaintance.

The next speaker was Neal W. Funk, Louisville, Ky., who was asked by Mr. Rice to show how claims are reduced by accident prevention.

CUTTING CLAIM COST THROUGH ACCIDENT PREVENTION

Mr. Funk began by explaining the importance of the claims man in the electric railway organization. He said that of all men employed in electric railway service he is the most trusted. The nature of his work is such that he must be trusted because he deals in intangible values of human life and limb. The claims man is also a judge, his slogan in settling claims being "not how cheap, but how fair." Any man with ethics other than this is not worthy of his high calling. The time has come, said Mr. Funk, when the claims director who expects to settle claims only is going to curl up and die. He must be a producer, and he can be such with a little extra energy expended in accident prevention work.

The claims director should have charge of all safety matters; in fact, if he knows more about the causes of accidents than anyone else in the organization, why should he not know best how to prevent them? The safety council with the claims director at its head is the way out of the obscurity which has always enveloped him.

Coming now to the experience of the Louisville Railway, Mr. Funk said that the claims and law departments eighteen months ago were costing this company 6½ per cent of its gross receipts. Realization of this fact caused the organization of a safety council. In a year following this step accident expense was reduced to 3½ per cent of gross receipts, saving about $150,000. There was less litigation under way than in twenty years. According to present prospects, the cost during the current year will not be over 3 per cent of the gross receipts.

Since the organization of the safety council there has not been a child killed or crippled on the property. In the year 1919-1920 seventeen persons were killed on the city lines, while in the following year the number was seven. During the first nine months of the present year only two persons were killed, and these involved little fault of the company. Since the organization of the safety council not a person has been injured on one of the fifty-eight grade crossings in Louisville.

Mr. Funk said that when the council was organized there was a lack of safety ideas on the property. Employees had no knowledge of the high duties under the law that an electric railway owed the public. The fact that the men were naturally careful was indicated by the fact that when crowds were handled accidents were few. The company inaugurated competition for low accident records, among the rewards being a monthly dinner to the carhouse with the fewest accidents per mile during the preceding month. J. P. Barnes, president of the company, acts as toastmaster at these. As an illustration of the results, one carhouse recently had a mileage of 25,000 without one accident reported during a month. Many safety suggestions are received from the men, and 90 per cent of these have been adopted.

REMARKS BY MR. EDWARDS

L. A. Edwards, Youngstown, Ohio, was next called on for some figures as to the results of accident prevention work by the Pennsylvania-Ohio Electric Company. He said that this company started a safety campaign early in 1920. As a result 1921 showed a decrease of 30 per cent in accidents and eight months of 1922, a decrease of 26 per cent over the same period for the preceding year. Casualties have decreased as follows: 1919, 26; 1920, 13; 1921, 4; 1922 (8 months), 2.

In addition to the statistics, Mr. Edwards said that accident prevention is important, first, from the broad and humane standpoint, but it also has an economic phase as illustrated by the above statistics. Experience generally throughout the country has proved that, where organized efforts have been made, accident prevention work has paid big dividends by reducing claims.

On the Pennsylvania-Ohio property monthly meetings of committees appointed from trainmen, linemen, and power-house men are held. The men are invited to hand in safety suggestions. These "intermediate committees" act on the suggestions or pass them on to the central safety committee.

Mr. Edwards illustrated how accident costs in public utilities have risen to staggering figures during the past few years. This is particularly true where there is a marked tendency to commercialize upon an accident; where solicitation of accident cases is common practise; where juries are only too ready to return verdicts highly inconsistent with loss or suffering sustained. The $1,500 jury of yesterday is the $5,000 and $20,000 jury of today. Similarly, the $100 claimant of yesterday is the $500 claimant of today.

While claims adjusters and investigators are invaluable to a property, said Mr. Edwards, it is important to look beyond the work of these men to accident prevention. Economy and good business should demand organized efforts in any industry, and especially in the electric railway industry, looking to this end. Accidents do not happen, they are caused.

REMARKS OF MR. OLDENBURG

Mr. Rice next called upon Charles Oldenburg, general claim agent Chicago & Interurban Traction Company, for remarks. Mr. Oldenburg said that the Bureau of Safety on that line had been functioning for two years and a half, and during that time there has been a notable decrease in accidents. Last year the bureau held twenty-four meetings with trainmen, thirteen with shop men, eleven with track and electrical men, and twelve with a central committee. At these meetings 492 recommendations were made, of which 444 were approved. Accidents as a whole were reduced 26 per cent, boarding and alighting accidents 49 per cent, and employee accidents 71 per cent. Eighty per cent of the automobile accidents were due to the fact that the automobiles ran into the rear or side of cars, ten to the fact that the automobiles pulled directly in front of the cars, and only 3 per cent were due to negligence of the railway employees. There is a law in Illinois, though not enforced, that automobile drivers must come to a full stop at or before coming to an extrahazardous railroad crossing.

During 1921 there were 606 deaths due directly to automobile accidents in Chicago and Cook County and only 345 fatal accidents due to the electric and steam railroads. Industrial fatal accidents numbered 261. This indicates that greater care should be taken by the state in issuing automobile drivers' licenses. The speaker's company has not had difficulty in this respect, as it has not had a single judgment entered against it for an automobile accident.

Mr. Rice then introduced Walter E. Robinson, Cincinnati, Ohio, who spoke on "Claims Department Practice Which May Encourage Claims." An abstract of this follows.

PAPER BY WALTER E. ROBINSON

Mr. Robinson said that it was his purpose to refer specifically to some evils in the line of this subject which have existed so long as to have become customs. The claims department, which is of comparatively recent origin, is a product of the complaints and criticisms arising from the operating and transportation branch of the industry. It is closely related to and a part of the transportation department. There are no hard and fast rules for solving the problems of the claims department and determining what its course should be. There should, however, be a more definite policy framed, and more effort made to standardize methods. If, said Mr. Robinson, the claims departments are indulging in practices which encourage claims, as the percentage of settlements for accidents would indicate, they are such as have aroused the hostility of the community as reflected in the attitude of the public mind.

The claims departments are influenced seemingly by a desire to popularize the department and to fulfill the expectations of the car riding public that any mishap occurring to them while passengers entitles them to pay.

Taking up the specific points of his topic, Mr. Robinson summarized them as follows:

Due to the practice of maintaining a force of outside adjusters, claims departments make entirely too many settlements without proper regard for those most entitled to consideration or for the industry itself. This reduces the department's function to a barter and trade basis and frequently opens the question of honesty and regularity of the entire transaction. Wholesale settlement of claims leaves the impression that the railway is an insurer against loss and injury resulting from its legitimate operation.

Another matter is the attitude on the part of some departments which discourages personal calls and encourages litigation, professional visits or summons or notice of suit by an officer of the court. A policy of isolation is unsatisfactory and irritates even those who are kindly disposed. Complaints should have the first call on attention and claims, imaginary or otherwise, are entitled to fair consideration.

It is also unwise to rush company surgeons to the scene of an accident or force their services on the injured, or near injured, immediately thereafter. This arouses suspicion and centers the patient's thoughts on the size of his claim.

It is a mistake to permit large numbers of suits to accumulate in a comparatively few offices, as this tends away from the handling of litigation on individual merit rather than on a bunching or wholesale basis.

Mr. Robinson closed with a word on the activities of claims departments following accidents. The haste with which settlements are attempted, the stock arguments advanced to induce settlement, the evidence of fear attending the departments' operations and the atmosphere of mystery which surrounds their movements are all unfortunate. The argument that it is necessary to do some of these things in certain localities to keep claimants from falling into the hands of lawyers is poorly founded. Is it a virtue to secure release for an injury for less than its worth, and a vice for a lawyer to try for more than its worth? Claimants should be given a chance to present their claims and know the company's method of dealing. In Cincinnati during the past year 80 per cent of all claims made against the company have been made in person at the company office.

President Rice next reported the following as the nominating committee: L. H. Butterworth, Boston, chairman; J. S. Kubu, Cleveland; C. M. McRoberts, Los Angeles; F. H. Warren, Chicago, and H. O. Allison, New Brighton, Pennsylvania.

Symposium on Automobile Accidents

Testimony from Several Parts of the United States and from Canada Indicates the Alarming and Increasing Seriousness of This Hazard—In Some Cities One-Half of All Accidents Now Involve Collisions with Automobiles

MR. RICE next referred to the symposium of papers which had been prepared on the subject of automobile accidents and called upon C. M. McRoberts, Los Angeles, to open the discussion. Mr. McRoberts spoke of the automobile problem in his city as probably greater than in the average, as evidenced by the fact that more than 65 per cent of the accidents are caused by automobiles. This is due in part to the fact that in Los Angeles the automobiles can be used during the entire year for pleasure purposes. Many tourists come to the city especially to spend their winters, bringing their automobiles with them. During four years the number of traffic accidents reported to the police department has trebled. In the first seven months of 1919 sixty persons were killed in traffic accidents on the streets, while for the first seven months of this year the number was 157.

In spite of the fact, said Mr. McRoberts, that this is the biggest single problem confronting the local railways, he had no definite solution for it. However, in Los Angeles, at least three organizations are having weekly meetings and discussions, formulating plans, and considering ordinances having to do with traffic congestion and traffic problems. The Los Angeles Railway is facing at this time the problem of getting its cars off the downtown streets of the city. The automobile congestion is becoming such as to make it impossible to get cars through the city during the rush hours. The company is facing the problem of some kind of terminal or loop. While the expense of widening the streets is staggering, this must come eventually.

In Mr. McRoberts' opinion the larger problem of public safety is in the hands of the people. If they appreciated the circumstances they would comply with traffic regulations. Co-operation of the public should be sought, through bulletins in the street cars, magazine articles, addresses before clubs and civic bodies, newspaper advertising, and such other channels of publicity as may be open. Public safety committees should be appointed wherever possible.

Among other things enumerated by Mr. McRoberts which electric railways could do in this matter is the securing of the passage of a law requiring drivers of all automobiles to be examined as to mental and physical fitness, and ability properly to operate motor vehicles on the streets and highways. There should be a maximum as well as a minimum age limit for all drivers.

Again, uniform traffic laws could be secured covering the operation of automobiles in all states. The rights and privileges of drivers should be clearly defined by law. It is now exceedingly difficult for a driver going from one state to another to comply with the law and not be a menace to others lawfully using the highways. There should be a uniform type of warning signs, and uniform methods of placing warning signs at dangerous points. A universal signal device notifying automobile drivers that they are approaching grade crossings would be helpful. Uniform laws covering rights of way, methods of signaling, etc., would also be of value.

The speaker also urged the passage of a law requiring the owners of motor vehicles to take out insurance policies in companies approved by the motor vehicle department, or the proper state department, the policies to cover not only insurance to pedestrians or others on the street, but to protect guests in automobiles. This would do much toward curbing reckless driving.

Another thing urged by Mr. McRoberts was a change in the law of imputable negligence. The general, although not universal rule, is that the negligence of the driver is not imputable to his passenger or guest. It is thought that the new rule should be as stated by the Supreme Court of Michigan in the case of Colborne vs. Detroit United Railway, 143 N.W., page 32, wherein the court said: "Where a person of mature years voluntarily enters the private conveyance of another to ride with him and by his contributory negligence is injured, she must be held to have adopted his conveyance for the time being as her own and to have assumed the risk of his negligence."

Another desirable ordinance is one prohibiting automobiles from driving on street car tracks in congested districts. There can be no question that the different automobile clubs and civic bodies generally are convinced that there should be a decided change in automobile and traffic laws and more rigid enforcement of them. The courts have been entirely too lenient with the traffic violator. Electric railways should get back of all prosecutions, co-operate with police departments and courts in every way, and see as far as possible that traffic ordinances and laws are obeyed. Rigid enforcement of traffic laws and ordinances does reduce accidents.

In some cities failure to enforce such ordinances will be excused on the ground that there are insufficient policemen. In these cases the police force must be increased.

Mr. McRoberts urged co-operation with automobile clubs, which will be found anxious to aid. So also will transfer companies, taxicab companies, dairies, department stores, etc. In cities where traffic congestion is heavy in the downtown districts co-operation with organizations urging street widening is desirable. Alleys should be constructed for the use of commercial vehicles in loading and unloading. Ordinances should be passed compelling pedestrians to move forward with vehicular traffic and prohibiting parking in the downtown districts during business hours.

Coming now to what can be done by the railway employees, Mr. McRoberts said that much of the burden of preventing traffic accidents must be borne by the men who operate the street cars. The highest type of men should be employed in train service. The claims department should co-operate in the training of men with a view to reducing accidents.

Mr. McRoberts said that he handles accidents like other investigations. The investigation should be made as soon after the accident as possible and should be thorough, covering every possible avenue of information. The investigator should be thoroughly familiar with the rules of law covering this class of accident. Immediately following the accident, before conditions have changed, the crossing at which the accident occurred should be photographed, showing all obstructions which might have prevented the party driving an automobile from seeing the approaching car. If possible, a photograph of the vehicle involved in the collision should be obtained.

A thorough investigation should be made of the location of the accident, and a careful canvass made of every house in the vicinity to secure signed statements from those who saw, or might have seen the accident. It is important, also, if others in the machine were injured besides the driver, to establish their relationship with the driver.

Where the claim investigator has fixed in his mind the rule of law affecting the possible liability of his company, it should be easy for him to collect all available evidence as to negligence or carelessness on the part of his company, as well as the parties in the automobile.

Mr. McRoberts said that in the adjustment of automobile cases he pays claims which are valid and declines to pay others, and where no personal injury is involved resolves all doubts in favor of the company which he represents. Where personal injury is involved it is often possible to co-operate with the driver or the insurance company involved. If an automobile accident has been thoroughly investigated promptly, the preparation of the case for trial is easy. The railway company wins its lawsuit because it prepares its cases with great care.

REMARKS BY E. M. RAVER, LINCOLN

The discussion was continued by E. M. Raver, Lincoln, Neb., who said that as a helpful means of preventing accidents his company, the Lincoln Traction Company, tries to cultivate an interest in accident causes. All employees are constantly reminded of the expense and suffering incident to automobile accidents. They are reminded that while the railways have certain rights in the streets, these are not superior rights. Thus if investigation develops the fact that the automobile driver has done everything possible to prevent the accident after the danger has become imminent, the claims department has but slight defense. Weekly meetings of heads of departments of the company are held for the consideration of accident reduction suggestions.

Accidents are immediately reported to the car dispatcher, who notifies the superintendent, the surgeon and, if there is a personal injury, the claims office. As soon as information reaches the last named, the investigation starts and no detail is overlooked. Included with the physical data collected are facts as to the standing of the damagee, his relatives and business associates, his probable legal adviser, his financial rating, and his record as a driver of motor vehicles.

The adjustment of claims, said Mr. Raver, is practically a matter of salesmanship. It is well to avoid making an offer of settlement until the claimant's idea as to what is expected has been obtained. Automobile accidents in which personal injuries have occurred are handled in Lincoln with greater care than those involving property damage. If after personal investigation there appears to be liability of the company, the settlement is made promptly if the demands are not unreasonable. In preparing a defense, in case a suit has been filed, the claims office stands ready to furnish counsel with a list of jurors who have served on traction cases during the preceding ten years. It appears that jurors who have served on damage cases and participated in adverse verdicts have a tendency to do the same thing again.

After the conclusion of Mr. Raver's remarks several papers were read by title. Abstracts of these follow:

PAPER BY E. J. PAIGE, BALTIMORE

The tremendous effect on the community of the automobile as a means of transportation, said Mr. Paige, was not at first fully realized, either from the standpoint of traffic or safety. The mushroom growth of the traffic has been so rapid that railways find themselves confronted with a serious situation without adequate means of regulation. In Baltimore, in 1912, only 2 per cent of the street railway accidents resulting in personal property damage or personal injury were due to the automobile, but in 1921 the figure was 25 per cent.

The remedy for this condition lies in education along proper lines, strict supervision and discipline. These will at least alleviate the difficulty. This work should not be confined to the street railway alone, but should reach the community at large through properly organized safety departments.

The Baltimore safety department was reorganized in 1919, and up to 1920 there had been a steady and alarming increase in automobile accidents. While the number has not since been decreased, as in other classes of accidents, the increase has been checked.

At first, said Mr. Paige, the efforts were directed almost exclusively to the company employees, but, through co-operation, the 75,000 automobile drivers have now been reached. In 1915 the cost of automobile accidents was 7 per cent of the total claims department expenditure, while in 1921 it was 18 per cent. In the first eight months of this year the amount was decreased to 15 per cent, due, it is believed, to the results of concentrated efforts along educational lines.

Experience in Baltimore has taught the importance of prompt investigation of automobile accidents, with an inspection by a competent inspector of the damage. The only cases called without investigation are those in which no property damage is reported.

Unless investigation discloses the fault of the railway company, the latter declines to settle and as a result has many suits filed growing out of automobile accidents. In 1921 this number amounted to 42 per cent of all suits filed. For the first eight months of 1922, while the company won 67 per cent of all suits tried, it won 85 per cent of all suits growing out of automobile accidents, and many of the verdicts for the claimants were for less than the damages proved.

The same policy has been followed with regard to insurance companies as with owners in subrogation claims. The insurance companies are reasonable when the position of the railway is understood. Experience of the company shows that best results in this work can be obtained by (1) effective and persistent safety efforts, (2) prompt and thorough investigation of all accidents, (3) prompt and fair adjustments of liability claims, (4) vigorous defense of those claims for which the company is not liable.

PAPER BY A. E. SHAW

A. E. Shaw, chief claim agent Montreal Tramways, said that in that city automobile accidents had gone up by leaps and bounds in the last few years until now more than 50 per cent of the accidents on the Montreal Tramways are hazards of that nature. Besides the 65,000 registered automobiles in the province there are many belonging to tourists. There is justification for the stand that all claims for damages to automobiles should be resisted with the exception of claims for damages when the automobile, going in the same direction, has been run into by the street car, or where the car has run off the track and thus caused damage. The subject can be divided into four parts: 1. Prevention of accidents. 2. Investigations. 3. Adjustment. 4. Defense.

In regard to prevention of accidents, the traffic laws might well be revised, but it is even more important that the present laws be enforced, and the claims department should bring infractions of these laws to the attention of the police. During 1920 forty-four arrests in one week were made of violation of the traffic laws at the instance of the railway superintendent, and the following week accidents between street cars and vehicles, outside of accidents at street intersections, were reduced 50 per cent. Uniform traffic laws are very much needed, and something should be done to compel automobile drivers to be acquainted with the traffic laws, such as to compel them to pass an examination. They should also be taught not to cross streets within a short distance of an approaching moving car or come in front of one, as there is the danger of collision owing to slippery rail condition, and they should give proper signals when an automobile is stalled on the track, etc.

The Montreal Tramways Company has adopted the policy of rendering accounts for damages to cars in collision with automobiles. This policy has had the effect of causing the chauffeurs of trucks to be more careful, as in many cases they have been compelled by their employers to pay the damage caused by their neglect and carelessness. All of the fault does not rest with the chauffeur and motormen should also receive more instructions in accident prevention, particularly the danger caused by a greasy rail.

Under the subject of "investigation," the speaker referred to the fact that witnesses on the street generally see more of an accident than the passengers. This is particularly true in regard to witnesses at the front of the car when the accident occurs at that end and in the rear of the car when the accident happens at the rear. Hence the employee should get names of witnesses among these bystanders. The past history of the injured party should also be ascertained, as some portion of his incapacity may be due to a previous accident. The police report should also be obtained and added to the file of evidence.

In the adjustment of automobile accidents, the personal element is fundamental. The successful adjuster should be endowed with common sense and be strictly fair to the claimant and to the company as well.

In the defense of an automobile case, information in reference to the records of chauffeurs is of great value, and all particulars about the persons who were the occupants of the automobile should be obtained. Evidence produced in court as to the distance at which an automobile can be stopped, proceeding at a certain speed, can often be used to advantage. Where the automobile was not carrying tail or front lights at the time of the accident, it is strong contributory negligence on the part of the owner.

PAPER BY MR. PRUGH

Charles B. Prugh, claim agent Columbus Railway, Power & Light Company, Columbus, Ohio, said that in 1921 45,000 automobile licenses had been secured in Franklin County, and thousands of other machines passed through Columbus weekly. Trainmen should be instructed in regard to sounding gongs, passing vehicles, location of dangerous intersections, etc., and weekly letters addressed to them and posted in the carhouses, showing the number of accidents occurring on the various divisions and calling attention as to how they might have been avoided, are sound propositions. The traffic supervisors can also point out to the men how to avoid collision.

During the past eighteen months 50 per cent of the accidents happening on the lines of the company have been with automobiles. There is no reason why such accidents should be investigated unless a claim is made, or the machine is damaged considerably or some one is seriously hurt. If investigation divides the responsibility, settlement may be made according to the findings, say from one-fifth to three-quarters of the repair bills. In nearly all accidents the company waits until claim is made before making an offer, and the same procedure is followed when suit is brought. The plaintiff's attorney must be the first to indicate a desire to compromise. Out of the last twenty automobile cases tried by the company only two verdicts were in favor of the plaintiff, and they were for small amounts. The other eighteen were either won by the company or settled out of court for nominal sums. The percentage of cost of automobile accidents, compared with the total outlay of the claims department of the company, for the eight months ended Aug. 31, was 28.8 per cent. The average cost per automobile accident for the same period was $5.11. For the eight months of 1922 the claims cost of the railway department of the company was 0.89 per cent of the gross railway revenue. Including light and power the percentage was 0.5 per cent. Local conditions, however, have a bearing on this percentage. Where there is a large foreign population, the percentage of claims and payment would probably be higher.

PAPER OF MR. WALTZ

The next paper was by V. J. Waltz, claim agent Community Traction Company, Toledo, Ohio. He said that auto deaths in ten American cities picked at random show increases in five and decreases only in those cities where safety campaigns have been in progress during the past two years as follows:

	1920	1921
New York	756	865
Chicago	542	668
Philadelphia	232	191
Detroit	240	134
St. Louis	102	97
Milwaukee	72	67
Rochester	37	38
Flint	52	25
Louisville	18	20
Grand Rapids	16	17

These figures include all kinds of accidents, not those caused by collisions between street cars and automobiles, but they show the necessity of inducing the automobile owners to drive safely. In Toledo the company has tried about everything it can think of to reduce this casualty list, such as school scouts, course of study in public and parochial schools, reorganization of the police traffic bureau, joint work with the local automobile club, systematic placarding of the front and rear of the street cars, and weekly talks at the carhouses to the platform men.

One of the best plans is the placing in all of the carhouses of what is called a "map reminder." A large map shows all of the car lines, and a careful check is made of the location of accidents, a circle being drawn at the point where the accident occurs, red if by day and black if by night. An "A" means an automobile accident. Other accidents are marked accordingly. These maps are posted once a month, and in the talks to platform men attention is constantly drawn to them, as they show the dangerous traffic corners. If it appears that vehicular accidents are occurring too frequently at any particular intersection, a slow order is issued for the particular point. If there is danger on a curve that the sweep of a car will bump either a person or a vehicle, a large warning sign to that effect is posted. This helps to prevent accidents and is also a weapon of defense as a warning has been posted at a dangerous corner.

In 1921 as compared with 1914, all kinds of accidents to the public were reduced from 3,008 to 2,295, the expenses from $149,225 to $69,729, and the percentage of gross revenue paid out for accidents from 7.818 to 2.35.

The method of investigating accidents is very similar to that described by some of the other speakers, though a special point is made to determine just when the auto was driven upon the track while the car was a certain distance away. Great reliance also is placed on interviews with witnesses as compared with mail investigation, and when the replies of the witness are written by the investigator instead of by the witness, it is the practice to have the answers brief and to have the witness write above his signature "I have read this statement, and it is correct."

PAPER BY MR. CONKLIN

George H. Conklin, claim agent Augusta-Aiken Railway & Electric Corporation, said that in a city with such wide streets as Augusta collisions between automobiles and trolley cars should be a rarity. The main street in Augusta is Broad Street, which is 160 ft. from curb to curb. Nearly all the automobile accidents on this street happen at the parking places, when the drivers carelessly go across the tracks. On other streets, the principal cause is cutting in front of the car. Forty-five per cent in number of all accidents of the company have to do with automobiles, though in expense the cost was only 14 per cent.

When a claim for automobile damage is made the claimant is told to have the repair work done on his own account, and if the railway company is liable it will settle with him. This allows the owner to think over the accident, and he usually recollects that he was primarily responsible and so does not push the claim. If he does, he will find that the company usually has taken the precaution to secure a list of witnesses to the accident who having seen it can explain how it actually occurred. But the company permits few automobile cases to reach the court house. If it is at fault it settles promptly. Where there has been personal injury the company has found little difficulty in settling the case by paying the property loss.

The company gives special attention in training its motormen, both old and new, to guard against automobile accidents by ringing the gong loudly before entering all cross streets, making "slow" crossings, etc. Space is given to the subject in the company publication, and warning signs are carried on the express car and sprinkling car. Two years ago when automobile accidents were very numerous the company called for help from the Chamber of Commerce, the City Council and the police. Some time previously the Council had appointed committees to see what was being done in other places regarding automobile traffic. As a result the "One Hundred Club" was formed, made up of representative citizens who agreed to report to a captain all violations of city ordinances by automobiles noticed by them. Secrecy was maintained as to the authorship of the report. This plan worked very well, and interest was only permitted to lag in it when the citizens generally began to travel in the proper direction, park in the designated place and otherwise obey the laws governing traffic.

Automobile accidents have also been reduced by the practice of having uniformed police at the three business corners to record offenders. These police are stationed in towers where they can observe the traffic well.

In concluding the Tuesday afternoon session, Mr. Rice called attention to the safety report of the Transportation & Traffic Association, copies of which had been distributed to the members present.

Wednesday Afternoon Session

Means for Circumventing the "Ambulance Chaser" Formed the Basis of Discussion at the Third Session of the Convention—The Contingent Fee Is a Source of Trouble in This Connection

THE Wednesday afternoon session of the Claims Association was begun with the presentation of four papers by W. W. Smithers, Joseph S. Kubu, John W. Yenson and A. E. Powell on the general subject of "Ambulance Chasers." Mr. Smithers' paper was presented in his absence by Mr. Hellmuth.

ABSTRACT OF PAPER BY W. W. SMITHERS

William W. Smithers, Philadelphia, in his paper on "The Ambulance Chasing Evil and the Remedy" described at length the practices followed by unscrupulous lawyers in securing and handling accident cases. He attributed responsibility for toleration of such conditions to the existence of the contingent fee contract. While showing how dangerous to the administration of justice is the contingent fee, he comes back to the confirming reality that we must concede the validity of a contingent fee contract between attorney and client, although it may contain every feature which our English forbears declared was champertous and constituted a menace to social order and the purity of our courts.

The courts have sanctioned contingent fees on the assumption that every lawyer is imbued with the high ethical ideals imbedded in the traditions of the profession. Mr. Smithers states that it is well known that such an assumption is unfounded in respect to many groups, for they deliberately debase their cloth and use the judicially expounded and reasoned term of contingent fee to justify a pure commercial gamble in broken bones and human blood.

As to the remedy Mr. Smithers said that there must be new laws of wider scope and of application differing from those applying for champerty and maintenance. Many men believe that regulation of all contingent fee contracts would thwart the evildoers. In that direction the Pennsylvania Bar Association worked for several years, and in 1919 drafted a proposed act requiring the contract to be sanctioned by the court and filed of record, thereby utilizing publicity as a preventive measure. However, no action on this was taken by the Legislature and there the matter stands. The principal objection made was that the proposed act, in attempting to regulate, gave a definite recognition to the propriety of such contracts. There is undoubtedly much force in that point.

A careful study of the whole question seems to indicate that legislation can be more effective if directed against the producing agencies; that is, the solicitor or runner. This was tried in New Jersey by an act passed in 1919 and is said to have had a favorable effect. It forbids any one who is not a lawyer soliciting upon a basis of compensation. It did not definitely prescribe a penalty and was not as comprehensive as it seems it could have been made. It has also been criticised because tacitly permitting lawyers themselves to do the prohibited thing. A bill identical with this was offered in the Pennsylvania Legislature in 1921, but was opposed by a group of lawyers engaged in the business, and after being amended in its vital points was even then allowed to die in committee.

At the Pennsylvania Bar Association last June there was presented the draft of an act along the same lines but embracing the solicitation of either criminal or personal injury cases, making it a misdemeanor and prescribing punishment by fine and imprisonment. It was approved and returned to a committee with instructions to have it offered at the coming meeting of the Legislature in January next. The substance of this act is to prohibit persons not admitted to the bar of any court of records in Pennsylvania, in certain cases, from soliciting any person in the state to retain any particular attorney to defend that person in any criminal prosecution or to institute or prosecute a suit for damages for wrongful act in which the person so soliciting shall by agreement receive from the person solicited, or from the attorney retained, any compensation whatever. Any person violating this act would be guilty of misdemeanor and upon conviction would be punishable by a fine not exceeding $500 or imprisonment not exceeding thirty days, or both. Furthermore, conviction for this offense would require the guilty person to repay to the party solicited the amount found by the court to have been so unlawfully received by the defendant and added as an additional fine at the time of sentence.

MR. KUBU DISCUSSES CLAIMS FRAUDS

In his paper, Joseph S. Kubu, former secretary of the Claims Association, described the devious methods and monstrous tactics used by the "ambulance chaser" to secure clients and manufacture exaggerated bases and claims. For sources of information this fellow peruses all police reports, scrutinizes the daily newspapers, has associated with him directly or indirectly persons of every tongue, organizes investigating and adjusting agencies, employs an occasional policeman who is unscrupulous, now and then succeeds in using an employee of the railway company itself, has agents and experienced scouts who discover the man who has had some sort of minor accident months or years before, fraternizes with some disgruntled doctor, and so on.

Having the information, the next step is to secure an audience with the injured person. In this respect, the ambulance chaser's methods have become practically a science. These men become very expert in their understanding of how to approach individuals. Sometimes the fearless audacity of an attorney will take him personally into the presence of the injured, but more frequently the way is paved through hired representatives. He then presumes upon the unsophistication of the prospective client and elaborates upon his own proficiency and successes in securing large awards of damages, while never failing to recite the heartless methods employed by the company where the client consents to deal directly with it. Finally convincing the client of the desirability of employing the particular lawyer in question, the injured person is forthwith induced to sign a contract which is an irrevocable agreement to pay to the attorney an unreasonably large proportion of what he may receive. Having this, the so-called lawyer then assumes an inflated sense of proprietorship and becomes dictatorial in outlining the course to pursue. He requires that the attending physician be dismissed and a substitute of his naming engaged instead. He goes to the railway company with an exorbitant claim, which the latter of course declines to make the basis of a settlement.

In course of time the case comes to trial. The very atmosphere of the court breathes an eager interest in the jury. Every individual who has assisted in building up the plaintiff's case is present, their evident purpose being to influence the jury and commend themselves as worthy of sharing in a large award. The real problem presented is the jury, the uncertainty of the final issue of a lawsuit, and every important matter connected with it has not escaped the thoughtful consideration of the ambulance chaser, nor has he failed to make all possible provision to influence everything in his favor.

Mr. Kubu then gave a number of illustrations of his experience to show the cunning and maliciousness with which these unscrupulous lawyers work.

MR. YENSON'S VIEW OF AMBULANCE CHASING

J. W. Yenson, New York City, in his paper on ambulance chasing, said that his experience had led him to the conclusion that the difference between the amount of money which the injured person eventually named as acceptable to him or her, and the demand of the ambulance chasing attorney, usually exorbitant, is the primary cause of litigation which is costly and altogether unnecessary. Many if not most of these claims would be settled amicably by the principals if left to themselves, assuming of course that the facts would justify the defendant in making an offer of settlement. It is a common occurrence for claimants and plaintiffs in cases of this character, realizing that they have been deceived, to call of their own volition at the claims department of the defendant company and beg that assistance be given in their attempt to induce their unsolicited counsel to withdraw. In New York it is necessary to contend with a coterie of a dozen attorneys, well known to each other. In every claim office at least one of them becomes active following any serious accident. These men are a disgrace to a noble profession and a thorn in the side of every claim agent.

Mr. Yenson then summarized the sources of information, citing traffic officers and patrolmen who keep attorneys' cards in their possession, hospital attendants, newspapers, etc. He also reviewed some of the methods employed to secure clients and place them in the position of having to sue.

He made the observation that with rare exception the lawyers who have been guilty of the unethical practices referred to are men of little legal ability, although some of them are possessed of unusual cunning and are highly ingenuous in devising perjurious theories of liabilities. A great many, possibly through fear, never try their own cases. They exact the largest fees, usually 50 per cent of the amount recovered, and it is a noteworthy fact that they will bring suit, regardless of whether or not a case is meritorious.

As a constructive suggestion Mr. Yenson gave it as his opinion that there should be closer co-operation among claim agents throughout the country in an effort to drive this class of lawyer out of the profession which he is disgracing, and thereby save thousands of dollars to carriers, besides greatly benefiting those who have unfortunately been injured. While they may in certain instances force a larger settlement, the injured person in most cases receives less as his share than he would have received by dealing directly with the company. The surest way to drive this pest out of business is through the bar associations. With possibly few exceptions, these organization are officered and controlled by the highest members of the profession, men who have the utmost contempt for this class of lawyer.

They are ready to act whenever sufficient information is laid before them. Another method is publicity, in order that the public may be enlightened as to the methods employed.

If we keep our own record clean in dealing with the injured, it should not be difficult to induce the managers and editors of the better class of newspapers to give prominent space now and then to the practices of these unscrupulous claim agitators.

CHAMPERTY AND THE LAWYER

Albert E. Powell of Squier, Sanders & Dempsey, Cleveland, presented a paper on the subject of "Champerty and the Lawyer," which reviewed the attitude of the courts toward the practice of soliciting for clients. He also quoted Canon 28 of the American Bar Association, which deals in very plain and disapproving terms with the feature of so-called soliciting. Referring to the contingent fee, Mr. Powell said that while closely knit to the solicited case, it is on a different basis. It is urged, and with force, that a poor litigant cannot have his rights determined and protected in an action at law unless an attorney is willing to take his case upon a contingent fee. Opposed to this consideration are others of weight. The whole question of contingent fees received the careful attention of the American Bar Association at one time, and when the canons of ethics of that association were being prepared, no one subject received greater consideration. It is said that 100 canons on the subject were formulated and submitted to the committee and reams of printed argument were offered. The canon finally adopted was a short one, No. 13, as follows:

"Contingent fees, where sanctioned by law, should be under the supervision of the court, in order that clients may be protected from unjust charges."

After the reading of these papers, President Rice said that, believing there are things that can be done to correct the ambulance chasing difficulty, he had taken the matter up with the American Medical Association and the American Bar Association. A letter from each of these associations was then quoted to indicate that both associations disapprove of such practices and endeavor to bring them into disrepute.

President Rice then called on R. R. Herrald, chairman executive committee of the International Claims Association, to discuss the problem from the standpoint of the casualty companies.

REMARKS BY R. R. HERRALD

In behalf of the International Claims Association, an association of accident claim adjusters, Mr. Herrald said that this association always stands ready and willing to give hearty co-operation to the railway claims association in any way that can be of mutual assistance, particularly in the matter of ambulance chasers. Referring to the difficulty of railways in securing medical examinations, he said that the insurance companies protect themselves in this matter by having a provision in the policies that the company shall have the right and opportunity to make an examination in any manner it may see fit of the insured. Mr. Herrald said that he had always had very good co-operation on the part of the claims departments of the public utilities, although he did not think that the latter availed themselves of this opportunity as much as they should. He presumed that the majority of the bureaus to which the railways belong subscribe to the Hooper-Holmes Bureau, that is, the information bureau of all accident risks. The moment an accident occurs in which an insurance company is interested, this action is reported to the Hooper-Holmes Bureau and by inquiry of that bureau it is possible to ascertain what previous accidents or injuries the particular person involved might have had.

President Rice heartily indorsed the suggestion of Mr. Herrald that use be made of the Hooper-Holmes Bureau, stating that he believed this to be the greatest defensive step that the Claims Association had ever taken, and he thought it would be more largely patronized if its usefulness became better understood. At this point he expected to hear from R. H. Doolittle, president of the Association of Railway Claim Agents, but he was not present. Mr. Rice said that this association had assured him of its desire and willingness to co-operate with the Claims Association and to give the electric railway men the benefit of any knowledge the steam railroad men had and to receive in return any suggestions, in order that some definite move might be adopted.

To bring out the local experience with ambulance chasers in several cities, President Rice then called on the claims men from New Orleans, Memphis, Tenn., and Waterloo, Iowa, which was as far as time permitted the discussion to be carried.

MR. KERNEN'S REMARKS

B. J. Kernen, New Orleans, said that the ambulance chaser was the least of the troubles in New Orleans. The company there has not fared badly with the courts either, except in the period immediately following the war, when the inability to get good labor was reflected in more accidents and a lowered standard of service. This gave the public a feeling of resentment and larger verdicts were awarded against the company in cases where the liability was uncertain. In Louisiana there are statutes under which damage suit lawyers seem to be particularly favored. One recognizes the contingent fee contract and permits the transfer of the claim to the attorney as security for the fee. It provides also that where the contract stipulates against a compromise without the consent of both attorney and client, a compromise with the client without the consent of the attorney does not protect the defendant and the suit may be prosecuted by the attorney as if no compromise had been made—this for the purpose of establishing the amount of the fee for which the attorney may have judgment against the defendant. The practice of the railway company has been that where demand is made through an attorney, settlement is made with the claimant only with the attorney's consent. It has been found that this rule has been productive of gratifying results.

Another statute permits the bringing of such suit *in forma pauperis* where the plaintiff produces two affidavits (usually easily secured) besides his own, if he is unable to advance the costs or furnish bonds therefor. The Supreme Court of Louisiana has construed this law to mean that the plaintiff may prosecute the suit not only in the trial court but also in the appellate court without payment of costs, and has also decided that even in those cases where the fee was on a contingent basis and the claim transferred to the attorney, the suit could be prosecuted through both courts without previous payment of costs.

There is also a statute granting to personal injury cases a preferential trial both in the district and the appellate courts; and another grants interest from the date of the service of the complaint on the defendant instead of from the date of judgment. Despite these unfavorable laws, there has been no material increase in this kind of litigation.

As a definite suggestion for restraining the practice of soliciting personal injury claims, Mr. Kernen said that in any legislation secured to curb the practice, the rights of both sides should be safeguarded, and the contingency charged by the attorney should be under the control of the court. If that could be accomplished, the practice of soliciting claims would soon cease. Objection might be made that such a law would be unconstitutional as interfering with the right to contract. Mr. Kernen was not prepared to say what force there is in that assertion, but gave it as his opinion that such a law would be constitutional. To support this opinion, he cited the fact that the fee of the attorney prosecuting pension claims is fixed by the act granting the pension, and that the workmen's compensation acts have somewhat curtailed the field of the procurer of personal injury claims.

Mr. Kernen said that laws punishing the solicitor of accident cases would not be enforced and that the only way surely to curtail the practice is to make it financially unprofitable.

EXPERIENCE IN MEMPHIS, TENN.

Roane Waring said that conditions in Memphis, Tenn., comprise ambulance chasing in its most developed form. He said he disagreed with a previous speaker that these ambulance chasers should be treated with tolerance. His idea was to handle such men without gloves. "A crook is a crook and my idea is that this fellow is a crook." Mr. Waring said that he thought the lawyers are more responsible for the troubles with ambulance chasers than anybody else, because they do not go after them sufficiently hard. He referred to the present practice in Memphis of handling all accident cases in the federal courts, on account of the company there being in the hands of receivers. In doing this it is arranged so that a number of cases that there is nothing in are sandwiched in between those of merit on which it has been impossible to agree on a settlement because the victim wanted too much. By the time the important case gets to the jury the latter has got a pretty general idea that the company is badly harassed, which is true.

Every effort is made by the company to avoid any evidence of trying to delay trial in any case. Another practice which has helped the company where an unscrupulous lawyer is involved is to move the federal court to make the lawyer give bond for costs, where the lawyer is interested in the litigation. The court sustains the company in this motion and the result is that the lawyer does not bring nearly as many trivial cases to court as he otherwise would. This has done more than anything in the experience of Mr. Waring to curtail this kind of litigation.

C. E. Pickett, Waterloo, Iowa, said he believes that special agents are just as necessary to defend this character of cases as lawyers are. As a result of following this plan, he cited several instances where unscrupulous lawyers and doctors in Waterloo had been forced to give up their practice and leave the city. In one case, three witnesses who testified in a lawsuit were sent to the penitentiary for ten years each for perjury. Mr. Pickett contended that it is up to everyone concerned with such a situation to meet it squarely, and if the attorneys on the other side are dishonest, to bring their dishonesty to the public and give it pitiless publicity. If the witnesses are perjurers, they should be sent to the penitentiary. Mr. Pickett stated that his company had not had an adverse verdict stand against it in twelve years. He emphasized again the importance of special agents as part of the work of a corporation lawyer. As a matter of policy he said that in handling these matters if there is a liability a company should settle, and if there is not a liability, it should fight.

Thursday Afternoon Session

The Closing Was Taken Up with Discussion of the Medical Testimony in Claims Cases, Together with a General Survey of the Claims Field—Revised Statement of Objects Was Adopted

AFTER the calling to order of the final session on Thursday afternoon by President Rice, William G. Marshall presented a chart on which 350 claims trials in which the Pittsburgh Railways had been a party were tabulated. In explaining the chart he said that the 350 cases were divided as follows: First, the average verdict was used in charting the various classifications. The various classifications were made by first dividing the cases among men, women and children. For each of these the cases were again divided among fatalities, dismemberment and other injuries. Each class of accident was then subdivided — for example, fatalities among married and single people, which in turn were divided as to class of work —labor, skilled labor, merchants, etc. Then laborers, for example, were divided into the ages of sixteen to twenty-one, twenty-one to thirty, thirty to fifty, and fifty plus; then each age was further subdivided as to nationality.

Following this discussion, the paper by William A. Challoner, Pittsburgh Railways, on the subject of "Medical Testimony in Defense of Litigation" was presented by the author.

THE MEDICAL POINT OF VIEW

He said that if medical testimony produced by the plaintiff is fair and honest, nothing is gained by the defendant in offering further testimony, or if the defendant's counsel is firmly convinced that no case has been made out in the law, he should offer no medical testimony. On the other hand, there are cases where such testimony is desirable. Some juries will believe that if the plaintiff's medical testimony is not refuted, the defendant's case is weak in other ways. The defendant must also often introduce medical testimony to hold down the damages to a point commensurate with the injury.

The medical man should preferably be of mature years and with considerable hospital experience, and he should give his testimony without showing prejudice. He should avoid where possible the use of technical language and should tell what his examination revealed rather than what it did not reveal. He should be present in court and hear all evidence on the injury, as his trained mind may sense the lack of connection between the symptoms and conditions described. It is not his duty to disagree with everything that the plaintiff's physician has testified to, but this does not mean that he is to answer only the questions put to him, and if he is sure of his ground he should be ready to deny the whole of the plaintiff's medical testimony with confidence and courage. Examples were given of claims defeated because of knowledge of the medical phases of the case.

Much depends on the charge of the trial judge, as the jury generally considers it more with a view to learn what the judge thinks of the facts than to get the rules from which the jury itself should find the facts. Hence it is of great importance that the medical testimony shall impress the judge himself.

The trial counsel and the physician should confer, so that the former will have a thorough understanding of the medical and surgical features of the case and know when to press a cross-examination of the plaintiff's physician and when not to. Great care should be taken when it is alleged that the plaintiff's condition is due to syphilitic infection. If possible, the case should be tried in such a way as to compel the plaintiff to make the first mention of that condition. Then it can be shown that its victims are often as innocent of personal wrongdoing as are sufferers from tuberculosis or typhoid fever.

Neither the medical men nor the trial counsel can afford to convey the impression that they regard themselves as in any way superior in intelligence to the jury.

DR. HALL ON CLAIMS INVOLVING WOMEN

The medical aspects of claims work as applied particularly to women involved in accidents were then treated in a paper presented by Dr. James Whitney Hall, a medico-legal expert of Chicago. The doctor said that because of the difference in anatomy, emotions, temperament and environment of the two sexes, conditions claimed as a result of an accident necessarily differ widely both as to subjective and objective symptoms. Women plaintiffs are far more prone to exaggerate than men. Then, too, the health of women is often supported by a slender thread, and a slight accident may produce greater and more serious results than in the case of the average man. It is generally recognized that a slight accident may do serious damage to a diseased or disabled person, while the same accident would injure but little, if any, one who is well. Hence, the added disability due to the accident is hard to estimate, especially with a woman, with the natural tendency to exaggerate.

The plaintiff's attorney in subjective complaint cases usually files a declaration averring that the plaintiff was entirely well and wholly normal prior to the accident. Then the proof of previous pathology and disability is not only valuable for the basis of amount of charges but has a strong tendency to discredit the plaintiff's entire case. Dr. Hall suggested that in considering any personal injury case where the pathological aspects are difficult to determine, it would seem that the only solution is a change in the present practice. He suggested that this change should constitute the practice of the appointment of a physician by the trial judge, another by the defendant, and a third by the plaintiff or his attorney, these three to make such examinations as they may in their judgment deem necessary to ascertain not only the exact condition of the plaintiff but the cause of the condition. This, in the doctor's opinion, would come closer to solving the trouble of arriving at the added disability caused by the accident than any other method.

At the present time, the defendant in Illinois is not permitted in any case to have a physician representing him make an examination without consent of the plantiff. The doctor said that such a law beyond all question is not only illogical, unfair and unbusinesslike, but absolutely ridiculous. He said it would be just as reasonable for a few merchants to attempt to sell a pair of shoes to an individual for a certain price without permitting the buyer to try them on.

In speaking of claims malingering, the doctor stated that this is not nearly as common among women as among men. In his twenty-five years of experience in medico-legal practice, he had had but one case in which he felt sure and was able to demonstrate that the plaintiff had no basis whatever for her claim. In other words, women exaggerate, but most of them have a foundation of some kind for the complaint originally, but there is no limit to what they can do in piling up evidence, and there is always some one ready to represent this woman if she wishes.

In recent years it has not been uncommon for one who is actually suffering from cancer or epilepsy and who has suffered some injury to make a claim that his condition is wholly the result of the injury. In view of the fact that the cause of these diseases has not been established, it does not satisfy a court or jury to have medical men, however competent and able in their profession, state that the condition did not come from external violence. The fact is almost equally true with regard to many other diseased conditions that are disabling, but in which the cause is known, namely, fecal infections, gallstones, peritonitis, appendicitis, hernia, etc. To answer such claims, it would appear that it can be successfully maintained that if the claim is true, all these conditions would be much more prevalent in industrial communities than they are in communities where trauma occurs but seldom. The converse is really true. In considering personal injury claims, public interest and the safety of life and limb should be paramount. At the same time the public should be given to understand as far as possible by publicity and other methods of information that every cent spent for dishonest claims is a waste which should be applied to the efficiency of the service, and that in the final analysis the public pays the claims. Dr. Hall then quoted Mason B. Starring in the comment that "those companies which have regarded the claims department as an aid to safe operation instead of a necessary evil are those which have gained the most in public approval and in net revenue."

At this point a paper on the medical defense of litigated claim was presented by Dr. John Leeming, medical counsel of the Chicago surface lines. As this paper is not yet available, it will be published in a later issue of the *Journal*. A pamphlet containing a digest of jury laws compiled by Walter M. Lindsay, Pittsburgh, was also presented.

J. H. Handlon, San Francisco, Calif., then presented a paper on "An Inspirational Review and Outline of the Probable Trend of Claims Work," which appears elsewhere in this issue.

At the conclusion of Mr. Handlon's paper, President Rice brought to the attention of the convention a proposed change in the statement of the objects of the association as included in the constitution and by-laws. Mr. Rice pointed out that the original statement of objects was so limited that, strictly speaking, all papers presented at this convention were contrary to the constitution. He said that the proposed new statement of purposes had been approved by nearly all of the past-presidents and that it was so stated as to give the members an opportunity to consider things along broader lines, and to attract some dignity and prestige to the association among the affiliated associations and others who may have transactions with the Claims Association. The new statement was thereupon unanimously adopted by the convention. This statement was published on page 329 of the Sept. 2 issue of *Electric Railway Journal*, and is republished on page 663 of this issue.

President Rice then brought before the convention his idea that it would be desirable to have some declaration of a code of ethics as a means of adding further prestige to the Claims Association. He said he had asked Russell A. Sears, who had been largely responsible for the drafting of Canon 28 of the American Bar Association's code of ethics, which deals with the practice of ambulance chasers, to prepare a suggested code of principles for the Claims Association. Mr. Sears was then called upon to present his work.

Mr. Sears pointed out that the matter was one of great importance which should be acted upon by a larger gathering than was then present as the meeting was drawing near to a close, and he therefore suggested that a committee be appointed to give consideration to a code of ethics and have a more definite code in readiness for discussion and action next year. A motion to this effect was made and carried.

Mr. Sears then took the opportunity to say that during the last fifteen years or more that he has been attending conventions of the Claims Association, he had never attended one that had done more good or shown a higher type of earnest effort, or a declaration of higher principles, and an endeavor to do what is right and live up to everything that is good, than the meeting this year.

Turning to President Rice, he said that he felt sure he spoke the sentiments of his associates when he voiced the gratitude felt to Mr. Rice for conceiving and carrying on the meeting. He then presented Mr. Rice with a token of the appreciation of his services in administering this splendid meeting.

After responding to the presentation, Mr. Rice reminded the convention that through an oversight no past-president's badge had been presented to J. J. Reynolds, Boston, who served the association preceding Mr. Rice. He thereupon handed Mr. Sears a past-president's badge and requested him to present it to Mr. Reynolds upon his return to Boston.

REPORT OF RESOLUTION COMMITTEE

A resolution expressing the loss of the association in the death of Louis Hoffman, formerly general attorney of the Public Service Railway of New Jersey, was adopted.

Another resolution adopted placed the Claims Association on record as approving the methods of promoting safety work and accident prevention as outlined at this convention, and urging the association to lend its best efforts to the conservation of property and life whenever and wherever there is an opportunity in this field of work.

Another resolution adopted provided for the appointment of a committee to study the automobile situation generally and to keep in touch with all matters bearing upon the subject and of interest to the association, for report at the next annual meeting.

Another resolution adopted provided for the appointment of a committee to study the subject of exorbitant contingent fees and ambulance chasing and to co-operate with all other associations to enforce the present laws prohibiting barratry, champerty and maintenance, and to urge legislative action in states with laws now inadequate.

NEW OFFICERS ELECTED

L. H. Butterworth, Boston, then presented the report of the nominating committee, whereupon the secretary was instructed to cast the unanimous ballot of the association, electing the following officers:

President, Wallace Muir, claim agent Kentucky Traction & Terminal Company, Lexington, Ky.

First vice-president, W. H. Hyland, claim agent Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.

Second vice-president, H. D. Briggs, assistant general claim agent Public Service Railway, Newark, N. J.

Third vice-president, Joseph H. Handlon, claim agent Market Street Railway, San Francisco, Calif.

Secretary-treasurer, James W. Welsh, New York City.

In connection with the election of Mr. Welsh as secretary of the Claims Association, the nominating committee pointed out that it had made somewhat of a departure from precedent in this nomination and that the reason for the procedure is this: Mr. Welsh is secretary for the parent association and it was the desire of the American Association that he should also represent the various affiliated associations. Upon the express request of the American Association executive committee, the nomination of Mr. Welsh was made.

For members of the executive committee, the convention named the following:

Joseph S. Kubu, Cleveland; S. J. Herrell, Knoxville, Tenn.; T. B. Donnelly, Pittsburgh; L. F. Wynne, Atlanta, Ga., and the officers.

After installation of the new officers the meeting adjourned sine die.

Review and Probable Trend of Claims Work*

That the Tendency Is Toward Control of the Accident Situation Is Illustrated by Experience in San Francisco—At the Same Time the Claims Department Faces New Problems, While Old Ones Are Ever Present

By J. H. HANDLON
Claim Agent Market Street Railway
San Francisco, Calif.

THREE questions present themselves. What have claim agents accomplished in the past? How are they meeting the problems of today? What are their plans for the future?

In my mind the most conspicuous work we have accomplished in the past is to broaden the functions of the claim agent, so that not only does he endeavor amicably to dispose of the accident that has happened, but he deems it his duty to try to prevent the likelihood of such accidents again happening. And in my opinion, by far the most beneficial results in accident prevention have been accomplished by the care exercised in the selection and training of platform men, the just enforcement of discipline, the interest aroused in these men by safety propaganda continually presented, and the adoption of safety devices for our cars.

In the year 1908 the cars of the Market Street Railway carried but 21,672 passengers per accident and in the year 1921 they carried 32,860 passengers per accident—an increase of 11,188 passengers per accident or 51 per cent. During the year 1908 the cars of this company traveled 2,158 miles per accident and in the year 1921, 3,297 miles per accident—1,139 miles farther per accident, or a distance greater by 52 per cent.

In 1908 but 4 per cent of accidents involving the cars of this company were automobile accidents, whereas in 1921 more than 52 per cent of the accidents in which we were concerned were automobile accidents—an increase of 48 per cent. It is true, however, that there was some decrease in wagon accidents during this period. But this amounts to but approximately 20 per cent. Also, during this period cars were speeded up to meet a faster schedule, two additional tracks were placed on the principal thoroughfare, making Market Street, San Francisco, a four-track street. Traffic congestion has also increased due to the increase in number of automobiles to the point that there is now one for every seven persons resident in San Francisco.

We have never had a general safety committee among our employees, but we have created the thought that every employee is a member of the safety committee. The co-operation of the public in accident prevention has been enlisted by using the backs of transfers and the windows of cars for advertising purposes, and occasionally safety campaigns have been launched. Our work among our own employees has been by far the greatest factor in reducing accidents. I cannot urge too strongly that the claim agent or safety instructor be allowed to assist in the selection and training of platform men. I am given the opportunity of addressing all newly employed men after they have been in the service of the company for thirty days. Not only do I talk safety, giving illustrations of accidents and telling what to do when an accident occurs, how best to obtain witnesses, etc., but I take advantage of the opportunity to talk company loyalty and courtesy to passengers and to develop a personal acquaintanceship among the platform men. This often proves very valuable to the claims department.

Safety work among the public is always desirable, but it should be borne in mind that the action of the public cannot be controlled as can the actions of the employees of the company.

Another lesson we have learned is the wisdom of not soliciting injured persons to file claims as was often done by immediately calling upon the injured person when an accident occurs, regardless of the extent of the injury or the cause of the accident. Fourteen years ago in the face of considerable criticism I adopted the policy of not calling on injured persons unless the injury was sustained solely through negligence on the part of the company, and even such cases were ignored if the injuries appeared to be of a trifling nature. In the latter type of case, a quiet investigation is made to see if the injured person is up and about his duties.

What has been the result of this

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*Abstract of paper presented before American Electric Railway Claims Association convention, Chicago, Oct. 5, 1922.

policy? In 1908 more than 25 per cent of all accidents we had developed into claims, and in 1921 but 15 per cent—a decrease of 10 per cent. Or in other words, if we had continued the policy of operating the claims department like a fire department, hastening out in fear and trembling as soon as a report of an accident was secured, there is a likelihood that we would now have 40 per cent more claims than we actually have.

What about the ambulance chaser? you may ask. Does he not solicit the case before the company hears from the injured person?

Well we have had that pest of society to deal with again and again. If it is not local talent, then we have the recent arrival from another state who starts in to open our eyes. We have by various means closed the doors of the receiving hospitals, the city and county general hospital, and the private hospitals to him. His record elsewhere is investigated, traps are set for him, even using the services of employees who similate injuries. The Bar Association is kept informed of his activities and methods, and the influence of that body is used to discourage ambulance chasing. By adroit methods, publicity is given to his tactics, and his advertisements offering free legal advice are used against him. When the condition has grown too acute, the ambulance chaser has been secretly competed against, and his unjust methods thus exposed to the claimant, who is usually disposed to be fair. When an ambulance chaser does present a claim, I usually make him a "slap in the face" offer, and compel him to file suit.

We have sometimes been able to use these ambulance chasers in gathering facts relative to accidents that do not concern the railway company, for example, where a reckless automobile driver has injured a person who has just alighted from a street car, or a person awaiting to board a street car. Such services become valuable in inducing the person injured by the street car to deal directly with the company, and the ambulance chaser is only too glad to render that service for the benefit he derives. Today, so far as my employees are concerned, we are almost free from the annoyance of ambulance chasers, who now make the object of their activities largely the unfortunate individual who is injured by an automobile.

Closer co-operation between the operating and medical departments has been developed in recent years, and the operating department is also kept better informed on various accidents, their location, kind, cost, and where responsibility rests.

PROBLEMS OF TODAY AND THE FUTURE

Some of our problems today are the frequency of automobile accidents, the ease with which the automobile passenger injured by collision of the automobile with a street car can recover for his injuries from the street car company; the woman juror; the need of securing co-operation of lawyers so that their clients will give the claim department an opportunity to adjust the claim before suit is filed; the exorbitant and unreasonable claims paid by adjusters for automobile insurance companies; the handling of claims of females with subjective complaints, etc.

Automobile accidents will decrease in number when a physical examination as to hearing, sight, and ability to operate an automobile in an emergency is required of all applicants for a license; when there is a minimum and maximum age limit for chauffeurs; when there are uniform traffic laws enforced by imprisonment of the driver, or by sequestering the automobile for a period of time; when automobile owners must carry insurance or furnish bonds sufficient to indemnify the injured person; when automobile insurance companies have a classified rate for automobile drivers dependent upon their experience and reputation and record for driving; when the public becomes aroused to the fact that the automobile is the most dangerous weapon ever placed in the hands of mankind.

As for the woman juror, it has been our experience that she applies the same reasoning power, the same impartial judgment, that a male juror does. Of course, women jurors are sometimes swayed by their sympathy when the accident has brought about a train of pitiable conditions. But what male jury is not? On the other hand, women jurors are inclined to be very skeptical of a woman who alleges a subjective complaint resulting from an accident.

Lawyers will be disposed to deal directly with the claims department if they can be relieved of much of the annoyance of handling the details of a claim. Hence we have established the policy in San Francisco of having an investigator call at the lawyer's office, should he write or telephone presenting a claim, and the duty of this investigator is to facilitate the matter of interviewing the claimant, securing statement from the claimant's witness, arranging for a physical examination of the claimant, and making appraisement of damaged clothing, automobile or other property, the securing of the original bills of expense, etc.

Whenever the opportunity presents itself, executive officers or adjusters of automobile insurance companies should be shown what an unwise plan it is to make lavish expenditures in the adjustment of claims.

Selection and Training of Employees*

The Author Gives Details of the Methods Used Recently by His Company and Contributes Many Practical Comments on the Report of the Committee on Personnel and Training of Transportation Employees Presented at the Chicago Convention

By M. McCANTS

Assistant General Manager Market Street Railway,
San Francisco, Calif.

THE report of the committee on personnel and training of transportation department employees contains many practical suggestions, but I am pleased far more by the ideal which underlay the activity of the committee, that is, the research ideal. Research, which in the past has been almost entirely devoted to the materials and methods of handling materials, is here directed toward the human units of our organizations and the processes by which the proper units may be selected and trained for co-ordinated and efficient work.

Much of the progress which we hope to make within the next decade will depend directly upon discovering and applying the fundamental principles of human behavior. Because this committee has concerned itself with the human phases of our organizations I look for real progress in the immediate future.

THE FUNDAMENTAL PURPOSES OF EMPLOYMENT

One of the fundamental purposes of the employment process is to select men who shall prove competent on the job. Those who do employing for the transportation departments must be unprejudiced and must not permit themselves to be diverted from the primary purposes of selection.

The second chief purpose of employment technique is to select men who will stay on the job. Some men could make good on the job but do not care to do so. Men who are superior to the job should not be hired at all.

We cannot neglect or ignore either purpose in selecting platform men, but I am inclined to believe that the greater emphasis should be laid upon selecting men who will stick.

Too often the men who do the hiring use intuitional methods. They "size men up"; they "have a hunch" that a certain applicant will make good. As a matter of fact, some employment managers have, through long experience, developed certain unconscious methods whereby they "size up" the applicants. If these methods could be made definite and set down on paper, analyzed and tested, even these men could become more skillful.

The ideal employment official is one who sets down in black and white the qualifications of the man he hires. He watches the employee go through the training process to see how quickly he grasps his duties. He makes a record of the employee's ultimate skill on the job, of his loyalty to the company, of his ability to rise to more responsible jobs. He notes how long the employee remains with the company, and finally he compares all these records to learn if possible which of the employee's qualifications at the time of employment had any bearing on his later career on the job.

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*Abstract of discussion on report of committee on personnel and training of transportation department employees at the annual convention of the American Electric Railway Transportation & Traffic Association, Chicago, Oct. 2-5, 1922.

It is only by constant and careful study that we shall be able to select the employment methods that do work, and to eliminate the elements which have no value.

SOME PRAISEWORTHY FEATURES OF THE REPORT

The committee report lists the advantages and the disadvantages of the two platform jobs so that the applicant will be more likely to understand the nature of the job he is seeking. This is important; too many men are hired with only the vaguest ideas of the work they will be required to do.

A careful discussion of the merits of the job with the applicant ought to cut down turnover by eliminating outright those who had not considered the disadvantages of platform work. Further, the applicant who accepts the job will be less likely to give it up later if he feels that he has thoroughly considered the situation before accepting. In the third place, the applicant will be impressed by the carefulness and fairness with which the employment work is done and this he will remember favorably whether he is hired or not.

Another commendable suggestion is that certain qualities of the applicant should be scrutinized and recorded by the interviewer. Even if the specific items suggested are not all essential, the important thing is that the interviewer must record a great many items of the applicant's qualifications on a data sheet, thereby accumulating facts which he may use later to determine which were of real value.

VALUE OF PSYCHOLOGICAL TESTS

Much of the report was devoted to psychological tests. I am in sympathy with the efforts of the committee in this direction, for they indicate a definite attempt to provide a means to measure the qualifications of applicants for employment. The results obtained by tests can be made a matter of record, and any effort to establish definite records is commendable. I wish, however, to indicate some general principles which must be followed in the use of tests if research efforts are to be co-operative and helpful.

First, we must not try to test too many different sorts of ability. If a man stands high in general intelligence he usually stands high in each of the special abilities. Therefore, any general intelligence test will measure the other qualities at the same time and almost equally well.

Second, if any psychological tests are to have wide use by employment managers, they must be so devised that the employment manager can apply them with a fair amount of study and instruction.

Third, short tests should be used. It would take too much time and energy of the employment manager to give all the tests which the committee suggests.

Fourth, tests should be easy to score. Many of those suggested in the report are hard to score. We ought to have only those tests to which the answers are either right or wrong.

Fifth, definite directions for the tests are needed. The report does not include directions for giving the tests. If one company uses one set of directions and another company uses another set, the results will not be comparable.

Sixth, high scores are not necessarily desirable. It may be possible to hire men who are superior to the job and who would soon become dissatisfied and leave. Although it is wise to carry on research and accumulate many facts about applicants and employees, it is equally wise not to jump at hasty conclusions concerning these facts.

RESEARCH RESULTS OF THE MARKET STREET RAILWAY

The Market Street Railway management, almost two years ago, became interested in learning whether motormen applicants could be selected more carefully, so as to cut down the number and the cost of accidents. We asked our various division superintendents to fill out questionnaires which would commit them to certain definite opinions concerning the qualifications necessary in motormen. We found, however, that the superintendents did not agree even on some things which we felt to be fundamental.

We then selected a group of the best motormen in the company and one of the poorest motormen and proceeded to make a careful analysis to find what traits, if any, distinguished one group from the other. We could not find that it made any difference whether they were married or single, nor did their previous occupations seem to bear any relation to their value as motormen. Complexion, color of eyes, color of hair, size and traits which usually impress the man who does the employing, seem not to have any value in marking off the best from the poorest motormen. However, our analysis seemed to show that men of North European ancestry are to be preferred, whether native Americans or not. It also seemed best to hire men younger than thirty-seven or thirty-eight, who have not many dependents.

INTELLIGENCE TESTS USED

Next we used the army intelligence tests on these best and poorest motormen. To those men with fair schooling we gave "army alpha" and to the others "army beta." The group of best motormen, containing twenty-four in all, made scores of from 26 per cent to 98 per cent. That is, the lowest score was better than the least intelligent 26 per cent of our general adult population could make, while the highest score was better than 98 per cent of our adult Americans could make. Of the twenty-three motormen in the other group, fourteen made scores below 26 per cent, while the other nine made as good scores as the men of the first group. These facts seemed to indicate then that men falling into the lowest one-fourth of our general population as regards intelligence are not good motorman material.

To reinforce our conclusion, however, we tested twenty-one motormen who had taken at least five days more than the ordinary period to "break in." Twelve of them fell below 26 per cent on the test. However, some of the men who were apparently unintelligent, and therefore took a long time to "break in," had actually developed into competent platform men. The findings with these slow learners left us in considerable doubt, so that we went at the problem in a still different manner.

APPLICANTS TESTED BY ORIGINAL METHOD

During the latter half of 1921 we gave to all platform men entering our service, until ninety had been tested, an intelligence test devised for our own special use. It was so constructed that all the employment manager had to do was to hand out the test booklet to the applicant and keep record on the time required to complete the test. We shall be pleased to have other companies use our test to check the results we obtained.

Recently we had our division superintendents rate all employees who had taken this test. When we compared the test scores with the superintendents' ratings we could draw no sweeping conclusions. For example, there was a greater tendency for motormen making the high test scores to quit the service than those making the low test scores; while among the conductors those making the lower test scores seemed to be more prone to quit. It would be unwise to say that this would always hold, for it may be possible to get motormen more interested in their jobs by more careful "breaking in" and follow-up, by wise use of house organs and other personnel methods. It may also be that the conductors testing lowest showed a greater tendency to drop out because they were not trained, in the best way, to perform their duties.

The division superintendents rated these ninety men as "above average," "average" or "below average." Of the men who are still in the service of the company, those who were rated "above average" made higher scores in the test than those who were rated "average"; and those who were rated "average" stood higher in the tests than those who were rated "below average." But the differences in test scores among these three groups were not large, and there were several exceptions, so that I cannot make any sweeping assertions concerning the value of test scores in selecting men for platform work. We need many more facts collected under different conditions before we can draw any definite conclusions.

GENERAL CONCLUSIONS ON TESTS

I shall venture to make a general statement as to our experience with these tests, even if I have to depend a little upon my own opinion rather than upon data. I believe that the brightest men as tested can, and usually do, develop into somewhat better platform men than those who stand lower on the tests, although they do not always care to develop into better men. The problem is to get the brighter men to want to make good on the job and to stay with it. The use of tests will probably aid the employment manager to eliminate the extremely unintelligent but the value of tests beyond that point will be conditioned largely by the methods employed in training the men.

The brightest men do not always become interested in their work or care to stay with it and, therefore, I am not sure that the brightest men should necessarily be chosen. But if we can improve our training methods we may be able to develop a situation where tests will have a much greater value than they seem to have at present.

Training should be not restricted to platform work. Our foremen, division officials and minor executives, all need training. Training of the real sort ought to make a considerable cut in the cost of turnover.

Certain phases of training are well cared for by our company magazine. The employees all feel the magazine is truly their own and contribute liberally to it. We have used it to offer good suggestions in railroading and to talk common sense in economics and government; but we never preach. We make a definite attempt to give recognition to good work of our employees and we use the pages liberally for this purpose.

At present there is a distinct need for instructors who are really trained for their jobs. We executives are largely to blame for this. The sooner we take pains to train our instructors carefully for their duties, the sooner will we cut down turnover among students, probationers and regular platform men, and the sooner will we have better operating service.

It is reasonable to assume that there is a one best way in which instruction should be given. When that way is agreed upon all instructors should adhere to it. Training manuals should be developed which shall include the topics in which the students are to be trained and which will indicate the best ways to present these topics. There should be training conferences for the instructional staff at which the various pedagogical problems should be seriously and thoroughly discussed.

Too much of the training that is being done is not closely supervised by the higher executives. There should be a constant flow to the higher executives of reports on student progress.

I have tried to indicate that there is a crying need for co-operative research by the member companies of this association. Let us have research for the selection of platform men; research which will not only help pay dividends but which will result in better-placed and happier employees. But above all, let us have research which is far-reaching and co-ordinated. This association could very well afford to map out a definite field of research and could parcel out among its members the bits of work to be done by each so that the results might be brought together and reliable conclusions might be drawn.

The association could arrange for one company to be used as a sort of laboratory in which intensive research could be done, with reports rendered back so that all companies might be benefited in a very practical way. I feel certain that if the report of this committee has accomplished but one purpose, it will have been extremely worth while, that is, to direct the attention of the association toward the seriousness of the problem of the human units which make up its organizations and the great need for definite organized research for the selection and placement and proper training of these human units.

APPENDIX

Mr. McCants' paper was accompanied by an extended appendix giving the results of studies made on the qualifications for motormen under the direction of the research committee of the Market Street Railway. An abstract of this appendix will be published by itself in an early issue of this paper.

National Association of Railway and Utilities Commissioners

THE annual convention of the National Association of Railway and Utilities Commissioners, which was postponed from Sept. 26-28, 1922, will be held Nov. 14-16, 1922, at Detroit, Mich., with headquarters at the Hotel Tuller. The date was changed owing to the coal strikes and the appointment of many state commissioners as coal administrators. The call for the convention declares that inherent in our system of government is dual control—federal and state—and the difficulty of harmonizing these functions has been, in no other field of public activity, so pronounced, perhaps, as in the regulation of railroads. For years the state commissions have had to resist the gradual encroachment of the federal power in the fixing of rates within a state to conform to the level of interstate rates, and the tendency in this direction must be checked. The call points out the decision of the United States Supreme Court in the Wisconsin rate case and the co-operation between federal and state authorities there proposed. The I.C.C. and the National Association have agreed upon a tentative program to make such co-operation effective and the chairman of the Interstate Commerce Commission will address the Detroit convention on such a plan. This address will be on the afternoon of Nov. 14, to be followed by a discussion of possible changes in the transportation act.

On Wednesday morning there will be a symposium on "What Constitutes Sound Public Policy in Telephone Regulation." On Thursday morning representatives of "the regulated" have been invited to address the convention. They will include Henry L. Doherty, who will discourse on "Gas"; M. H. Aylesworth, who will deliver an address on "Public Relations"; Martin J. Insull, who will talk on utility problems, and Frank J. Smith, who will speak of the furnishing of light and power in New York.

On the afternoon of Wednesday there will be a round-table discussion on "State and Federal Regulation in Connection with Depreciation." On Wednesday evening there will be a round-table discussion on "Rural Extensions of Electric Light and Power Service."

Among the committee reports to be presented will be those on public ownership and operation, safety of operation of public utility companies, service of public utility companies, public utility rates, statistics and accounts of public utility companies, valuation, state and federal legislation, motor vehicle transportation and litigation.

A.S.M.I. to Admit Utility Engineers

AT THE twenty-eighth annual convention of the American Society for Municipal Improvements, held in Cleveland during the first week of October, the constitution was amended so as to admit engineers of public utility companies to active membership in the society. This matter is commented on editorially in this week's issue of the *Electric Railway Journal.*

The purpose of this revision of the constitution is to provide for closer co-operation between municipal and electric railway engineers, in particular, and it is the hope of the electric railway men who have fostered this change that electric railways generally will be represented by at least one engineer each in the A.S.M.I. membership. The membership fee is $7.50 per year. The secretary of the society is C. C. Brown, St. Petersburg, Fla.

Rail Welding Discussed at Chicago

A MEETING of the committee on welded rail joints of the American Welding Society was held on the Municipal Pier at Chicago, on Thursday, Oct. 5. E. M. T. Ryder, Third Avenue Railway System, New York City, vice-chairman of the committee, presided.

Methods for making tests on full-sized specimens were discussed. H. F. A. Kleinschmidt of the Lorain Steel Company exhibited a drawing and described the fittings necessary for holding and gripping the test rail sections in order to make tensile tests in the Emery testing machine at the Bureau of Standards in Washington. The present plan is to test girder rails of 7-in. section only.

H. M. Steward, Boston Elevated Railway, described the bending tests that he has been conducting. A discussion followed as to the machines available for making the required bending tests. Prof. D. D. Ewing, Purdue

University, told of the machines available at the university and described some tests that he has been conducting.

Methods of testing welded rail joints, as suggested by the United States Bureau of Standards, Washington, D. C., were outlined by Dr. H. L. Whittemore. These included suggested methods for making tests of conductivity, tension tests, bending tests, and impact, hardness and abrasion tests. In regard to making impact tests which will duplicate service conditions, Dr. Whittemore said that an instrument for this purpose has been devised and the co-operation of the Bureau of Public Roads can undoubtedly be obtained, as it is now investigating impact on roads. Methods of making microscopic examination and chemical analysis were also outlined.

C. H. Clark, Cleveland Railway, described a proposed testing machine for testing joints which will approximate actual service conditions. This machine has not been developed yet and was only offered as a suggestion of a possible method.

A program of investigations to determine the present state of the art in making welded rail joints was outlined by Mr. Ryder. A numbering system that has been worked out, together with instructions to the steel companies furnishing rail, to the railways which prepare test specimens and to the laboratories making the tests was also presented.

There was considerable discussion as to methods to be used in preparing the test samples, and it was the general opinion that these should be prepared under such actual conditions as are encountered in making welds in track under actual service conditions.

A condensed statement of replies received to a questionnaire on base plates was distributed to members of the committee.

Fall Meeting of Electric Power Club

THE Electric Power Club will assemble at the Grove Park Inn, Asheville, N. C., for a four-day meeting from Oct. 30 to Nov. 2. The first few hours of the convention will be occupied by numerous committee meetings. A general session will be held on the evening of Oct. 30; section and division meetings on the mornings of Oct. 31 and Nov. 1; and general sessions on the evening of Oct. 31 and the morning of Nov. 2. The proceedings, while covering principally the problems of the manufacturer, will contain much of interest to the user of electric motors.

American Association News

Report of Committee of One Hundred

THE report of the committee of one hundred at the Chicago convention said that its call for funds to carry on the work in the past year had met a very generous response and more than $45,000 was pledged and collected for carrying on the work. On Sept. 27, $14,797.19 still remained in the treasury, against which there are August expenses of about $2,500. The advertising section, for whose work the funds were raised, has been in active operation since Jan. 1, 1922, the American Electric Railway Association advancing funds for the payment of bills until such time as the committee was able to discharge the obligations itself.

The advertising section has obtained the publication of a large amount of educational information in the daily newspapers and periodicals for the electric railway industry, has prepared and distributed a large amount of printed advertising material dealing with electric railway situations of national interest, and has rendered personal services in special cases to many individual companies. Service is given to all electric railway companies by the advertising section regardless of whether they are members of the association or not.

The committee concluded its report with the statement that it feels its work of education and information has been extremely valuable in creating a greater feeling of confidence on the part of the public in the electric railway situation and that it should be continued. The committee has every confidence that the necessary funds will be provided as in the past when necessity requires and urges that every organization and management in the industry, members and non-members, all make the fullest possible utilization of the service irrespective of whether they have contributed to the funds.

Shall the Mid-Year Conference Be Held in California?

AS was noted in the report of the first meeting of the new executive committee, held in Chicago on Thursday, Oct. 5 (see *Electric Railway Journal*, Oct. 7, 1922, page 580), an urgent invitation was presented by the California Electric Railway Association to hold the 1923 mid-winter conference in California. The executive committee discussed the question at length and finally advised its subjects and meetings committee "to give serious consideration" to the California invitation. Invitation was also received to hold the conference in Washington, D. C.

California members join with the rest of the association in desiring the conference to be a success, if held in California, and success depends in part at least on attendance.

It is with a special emphasis therefore, that electric railway men are urged to consider Secretary Welsh's request for an expression of opinion which will help the subjects and meetings committee decide what to do. If a copy of the letter, quoted below, has been received, it should be answered at once. If not, Mr. Welsh should be advised of members' wishes anyway.

LETTER OF SECRETARY WELSH

Oct. 18, 1922.

TO MEMBER COMPANIES:

Gentlemen: A very cordial invitation has been extended to the association by the California Electric Railway Association to hold our next mid-year meeting in the early part of 1923 on the Pacific Coast.

This invitation was presented personally by W. R. Alberger, at the last meeting of the executive committee in Chicago. I am inclosing herewith an abstract of his remarks, setting forth some reasons why the selection of the Pacific Coast would be desirable.

This matter has been referred to the incoming committee on meetings and subjects in order that it may consider this question more intelligently. I have been instructed to ask you whether you would favor holding the mid-year meeting at San Francisco, and if this location is chosen, whether your company would be represented and if so by how many delegates. Your prompt response will be greatly appreciated, since if it is decided to go to the Coast, preparations must be made well in advance.

Yours very truly,
JAMES W. WELSH,
Executive Secretary.

W. R. ALBERGER'S INVITATION

The recent meeting of the executive committee of the California Electric Railway Association authorized me to extend to the American Electric Railway Association an invitation to hold the 1923 mid-winter meeting in California.

We have figured out that a trip could be made out there without any great loss of time to the members who come from the East. At that season of the year California is at its best. It is after our winter rains; the country is green, covered with wild flowers and everything is beautiful. We have a wonderful state, and all that kind of thing, and I can say this, and promise this to you, that if you do come, we will see to it that you have a fine trip through California; you will see everything that is at all interesting and you will have a good time.

Our suggestion would be to go directly to San Francisco from Chicago, as a starting point, putting in a day or two there; then for a little recreation and the formal meeting and banquet, our boys have suggested Hotel Del Monte. We have also a golf course on the shores of the wonderful Monterey Bay, and some of the leading golf experts and professionals of the world play there; in fact, Barnes, who was out there recently, lost his game, he said, because he was watching the scenery too much. Del Monte is the pleasure ground of California. It has more attractions than any other place in the West, and more of a variety. Then it would be suggested that the journey be continued on over night to Los Angeles and San Diego; a trip over into Old Mexico, and then home, with a side trip to the Grand Canyon.

In regard to rates we believe that we can secure from the Transcontinental Passenger Association a special rate. At that time of the year the heavy winter traffic is over. We believe we could get a special rate of at most one and a half times the one way fare. We are very anxious to have the conference out there.

We have nineteen privately owned electric railways in California; eleven of those railways are members of this association; five of them are the largest companies in California.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

More Subways Proposed

New York Body Plans Staten Island Route, Brooklyn-Queens Line and Washington Heights Extension

The New York Transit Commission announced on Oct. 13 the submission to the Board of Estimate of New York City of the routes, maps and general plan of further new subway routes included in the commission's program of May last, including the extension of the Broadway subway of the Brooklyn Rapid Transit Company from Fifty-ninth Street and Seventh Avenue to Washington Heights, and the Staten Island tunnel connection from Brooklyn, and the Brooklyn-Queens crosstown subway. The Board of Estimate set Oct. 20 for the hearings required by law to be held "within ten days of the date of submission."

The series of routes covering the Washington Heights extension present a radical departure from the commission's plan of May. That plan included the new trunk subway and feeders, known as the "Eighth Avenue line" extending north and south from 181st Street and Washington Heights, by way of Fort Washington Avenue, Amsterdam Avenue, Eighth Avenue and Hudson Street to a new general transfer station at Chambers Street. The B. R. T. extension, as then projected, was terminated at 155th Street and Eighth Avenue, in Harlem.

SMALL ADDITIONAL COST INVOLVED

The consideration of the needs of Washington Heights for additional transit, as explained by representatives of that section at the time the original plan was presented, induced the commission to have new studies made.

These studies have developed that, at a relatively small additional cost, the B. R. T. line could be made more effective and serve a much larger community by being continued up St. Nicholas Avenue from 155th Street to a point where connections can be made either by spur tracks or passageways to the Eighth Avenue trunk line north, as well as to the existing Interborough line, which turns out of Broadway into St. Nicholas Avenue at 168th Street.

The question of the selection of the best route to Staten Island has had the attention of the commission for several months. It has been convinced, through the studies made, that the best interests of all concerned will be served, both from the engineering and traffic standpoints, by the Narrows route, from Fort Hamilton to Pennsylvania Avenue, Rosebank, S. I. Plans for the extension of the Fourth Avenue subway in Brooklyn from its present terminus at Sixty-sixth Street to Ninety-fifth Street, Fort Hamilton, have already been authorized. This is a link in what will become the main Staten Island line.

The new route, beginning at the terminus of the Fort Hamilton extension, will extend as a two-track subway or tunnel southwesterly and westerly, under private property and streets, to the Shore road at Ninety-seventh Street. It will then cross the Narrows with a curve toward the Staten Island shore, turning under Pennsylvania Avenue to a point in the existing right of way of the Staten Island Rapid Transit Railroad.

Provision is also made in the route description for two branches in the Borough of Richmond, both leaving Pennsylvania Avenue at a point near New York Avenue and turning north and south, respectively, to points at which connection can conveniently be made at the north with the tracks in the South Beach branch of the Staten Island Rapid Transit Railroad and at the south at or near Belair Road with the tracks of the same system.

Alternative profile maps have been prepared covering the method of construction on the Staten Island side. Under Pennsylvania Avenue, as far as Reynolds Street, the line will be in subway or tunnel, whence it may be continued either in subway or open cut tunnel to Southside Boulevard, or as an elevated road from Fox Street in order to effect a crossing over the existing railroad right of way at that point. Both branches would be practically subway to their point of connection with the existing tracks.

The building of the B. R. T. extension north of Fifty-ninth Street and under Central Park West will pave the way for the permanent removal of the surface railroad tracks through this section. In the $218,000,000 five-year construction plan presented by the commission in May, the B. R. T. extension north was included at an estimated cost of $26,500,000. This figure will remain unchanged as far as the building of the line to 155th Street is concerned. No estimates have been made for the new Washington Heights portion.

Wages Settled.—The wage agreement between the Boston & Worcester Street Railway, Framingham, Mass., and its employees has been agreed upon without arbitration. Uniformed employees are to receive the present wage of 54 cents an hour until March 1, 1923. From March 1 to Oct. 1, 1923, the rate will be 53 cents an hour. Wages of other employees will be reduced 1 cent an hour on March 1.

Rapid Transit Urged for Detroit

The subject of rapid transit for the city of Detroit has again been brought up for consideration. Mayor Couzens has announced to the City Council that he considers a rapid transit system is the next step in carrying out the city's transportation program. The Mayor in addressing the Council stated that now that the city has a unified system of surface lines, and with traffic conditions growing more difficult, the time has come when the city should formulate a rapid transit program.

An appropriation of $50,000 in the 1923 budget has been agreed to by the Council following the recent consideration of the question, that sum to be used to pay for preliminary investigations. The work is to be started within a few weeks and a report made to the Council next year.

Councilmen in discussing the question indicated that tube subways or a dip system would be favored for the downtown section and that elevated lines would not be tolerated by residents on the main thoroughfares where rapid transit is most needed. Other paralleling side streets where elevated lines could be built do not penetrate directly the districts where rapid transit is most needed. It was pointed out by the members of the Council, also, that a comprehensive subway system would be too expensive for the city to undertake at the present time and it was agreed that subways should be built in Woodward Avenue and Michigan Avenue.

Wage Increases Under Consideration

At a meeting of the Springfield, Mass., trolley men Oct. 17 the matter of seeking a wage increase upon the expiration, on Dec. 31, of the existing contract with the Springfield Street Railway was considered. Demands in preparation by a joint committee of employees of the Springfield and Worcester companies are said to include restoration of pay rates in force prior to the readjustment made effective March 1 this year and certain changes in the working conditions. By the latest change the pay of blue uniform men was cut 10 cents an hour, the present rate providing for 40 cents an hour for the first three months service, 53 cents for the ensuing nine months and 58 cents an hour thereafter.

Under the agreement sixty days notice is required of either side seeking new terms. The Springfield company has as yet made no statement of its attitude in the matter, but General Manager H. M. Flanders personally indicated that a demand for an increase of pay would be unjustified.

New Grant Proposed

Twenty-Year Franchise for Rockford City Traction to Go Before Council —Improvements Promised

A new franchise ordinance for the Rockford (Ill.) City Traction Company is to be submitted to the City Council. Thirty days after the passage of the ordinance the company must file with the city clerk of Rockford its written acceptance. Upon failure to do this the ordinance becomes null and void and of no effect.

The franchise calls for a twenty-year grant authorizing the company to operate on all streets, avenues, highways, bridges and public ways within the city limits of Rockford upon which the car lines of the company are now in operation. Tracks are to be laid in the center of the streets and avenues in all cases unless otherwise directed by the City Council and in the case of double tracks upon such streets and avenues, the tracks shall be laid at such distance from the center of the streets as shall make the center point between the two tracks the center of the street, and in such manner as to leave a distance of at least 10 ft. between the track centers, and said tracks cannot be laid within 12 ft. of the curb line unless permission be first obtained from the City Council.

On the question of paving, Section 12 of the ordinance requires the company, after the city of Rockford has paved or repaved any of the streets on which the company operates, to relay its tracks at its own expense and to hereafter maintain the space between the rails of the track and 1 ft. on each side of the track, and the space between the track where there is a double track laid, except where an individual is the occasion for the repair work. The city reserves the right to order removal of track whenever necessary for purposes of public improvement and in this event the expense shall be borne by the railway company except when the removal is made on behalf of some company or private individual, the cost in this case being borne by said company or individual.

Abandonment of any street or streets occupied under the terms is prohibited unless permission is given by the Illinois Commerce Commission or such other authority as may be constituted by law.

A section in the franchise ordinance provides for the company's maintaining an efficient service with an agreement on the part of the company to make such changes and improvements as may be ordered from time to time by the Illinois Commerce Commission.

The section of the grant dealing with the matter of fares reads as follows:

> The rate of fare for any continuous and regular trip from one extreme point to another on any of the lines of said grantee, including transfers from one of the lines to another, shall be such a rate as shall be established from time to time by the Illinois Commerce Commission, or by any other authority delegated from time to time by the Legislature of the State of Illinois to fix rates for public utilities, including the City Council of the City of Rockford, if by act of the Legislature the City Councils of the cities are authorized to fix rate of public utilities.

On the matter of free transportation the ordinance stipulates that certain city officials who shall have this privilege must wear badges, the numbers of which must be reported in writing to the traction management.

An important provision of the grant gives to the city of Rockford the right to take over the traction system, which shall include any bus system operated, at the end of twenty years or before the expiration of the grant upon the terms and provisions of an act which made such provision. This act was passed by the General Assembly of the State of Illinois, approved June 26, 1913, and in force July 1, 1913. In the event this act, entitled "An act to authorize cities to acquire, construct, own and to lease or operate Public Utilities, and to provide the means therefor," is adopted the city shall pay to the grantee a sum equal to the then present value of such property as a going concern. In case the city and the traction company are unable to agree on the value of the property which the city proposes to acquire the value may at the option of the city be determined by arbitration. The decision of a majority of said arbitrators shall be binding upon the parties.

Immediately upon the passage and acceptance of this ordinance the Rockford City Traction Company will lay a new double track with necessary switches so that two separate and distinct car lines can be operated from the center of Rockford to the factory district and southeast part of Rockford. Work on other relaying of tracks and paving is promised by the company to be started as soon as practical after the passage of the ordinance.

Bus Service to Continue Pending Appeal

The Board of Estimate of New York on Oct. 16 unanimously agreed by resolution adopted to issue 400 revocable permits to owners of buses to operate on thirty-three routes in Manhattan and The Bronx. This action was taken at the suggestion of Commissioner of Plant and Structures Grover Whalen at a special meeting of the board to cover the present emergency whereby 200,000 persons would be inconvenienced daily by threatened cessation of the bus service on those lines because of an injunction obtained from Supreme Court Justice Mullan.

Corporation Counsel O'Brien announced to the board later in the day that Justice Mullan had suspended the operation of the injunction on the strength of the board's resolution and pending the trial of the case, which had been appealed by the city. This will permit continuation of the bus service on the various routes affected, provided the applicants for permits also obtain from the Transit Commission a temporary certificate of necessity and convenience, which the commission had assured in advance would be granted.

Explains Rate Base Increase

Former Receiver O'Keefe, of the New Orleans Railway & Light Company, New Orleans, La., recently absorbed by the New Orleans Public Service Corporation, has submitted a special report to Commissioner Paul Maloney in which he shows that there has been an increase of $4,746,869 in the rate base of the company during the last twenty months. Commissioner Maloney objected, however, to the inclusion of $436,748 in the rate base, as given in the report of Niles & Niles, expert accountants, and after several days of conference, this sum was taken out, making the changed figure $4,310,121. Thus the rate base has been increased from the original amount of $44,700,000 to $49,010,121.

The receiver shows that this increase was due to the investment of funds derived from the sale of receiver's certificates and to the fact that the earnings of the company were permitted to stay in the company in lieu of the flotation of additional securities.

In commenting upon the financial condition of the company, the receiver said that the strong cash position of the company was due largely to the fact that the amount of uncollected bills had been materially reduced and that the amount of the inventory of materials and supplies was also smaller, due to the continued policy of careful purchasing and avoidance of unnecessary duplication.

Amendments in San Diego Meet with Approval and Disapproval

The proposed amendment to the charter of the city of San Diego designed to relieve the San Diego (Calif.) Electric Railway of the obligation to pave between its tracks on future construction work was defeated at the special election held Oct. 10, by a majority of 458. The unofficial returns reported on the vote were: For, 6,504; against, 8,962. The referendum ordinance granting the company a franchise for a line on Sixteenth Street between Broadway and Market Street was carried by a favorable majority of 59. The unofficial totals were in this case: For, 7,187; against, 7,129.

The company had put on an educational campaign for a month preceding the election, both through the newspapers and by circulars and public exhibits, designed to explain the proposed measures.

The Sixteenth Street franchise, which had been refused the company by the City Council some months ago and referred to the people by a petition initiated by the company, will become effective immediately following the official canvass of the votes, it is said.

No announcement has come from company officials, but it has been intimated that the proposed charter amendment, or a similar one, may be again submitted at the regular city election next spring. These issues in San Diego have been referred to previously in the *Electric Railway Journal.*

Fund Being Raised for Electrification

Evidence of further activities to electrify the Union Pacific Line entering Glendale, Calif., is shown by efforts of residents in Glendale, Montrose and La Crescenta in uniting to raise $25,000. This sum when added to the $100,000 that has been promised by the Union Pacific System and the Glendale & Montrose Railway will be devoted to the electification of the old Los Angeles & Salt Lake Railroad line (now owned by the Union Pacific) from Glendale Avenue and Broadway in Glendale to its connection with the Los Angeles Railway Corporation's trolley line at the junction of San Fernando Boulevard and Verdugo Road.

It is expected that the electrification of the old steam road line will give patrons direct connection with the cars of the Los Angeles Railway, with the privilege of a universal transfer to any point on that system, all for the one fare. It is anticipated that it will also reduce the present fare between Glendale and Los Angeles 20 to 33⅓ per cent and will furnish two lines of car service in place of the present single interurban line of the Pacific Electric.

Approximately $20,000 has already been raised, and it is expected that the remainder will shortly be forthcoming.

Veterans' Association Meets

The first annual banquet of the Veterans' Association of the Wheeling (W. Va.) Traction Company was held at the Windsor Hotel with fifty veterans of twenty or more years standing in the company's service in attendance. Robert Earp, president of the association, acted as toastmaster. Emmett E. Erskin, a veteran, delivered an address in which he compared the first cars of the system with those of the present day.

C. P. Billings, vice-president of the West Penn System, delivered an address and presented service buttons to the men in the employ of the company twenty years or more. The buttons are of gold and enamel and bear the words "Twenty Years Service" and "Wheeling Traction Company" with the motto, "Service, Speed, Safety."

The Veterans' Association was formed on July 12 with the employees of twenty years standing as the instigators.

Another Interurban Proposed

Following the recent adoption of plans for electrifying the division of the Missouri, Kansas & Texas Railroad, between Dallas and Denton, 32 miles, and its operation as an interurban line by the Texas Electric Railway interests, steps have been taken to establish another interurban line out of Dallas, with Greenville as the proposed terminus. This is to be obtained by electrifying the St. Louis Southwestern Railroad between the two points, about 45 miles.

Daniel Updegrove, president of the St. Louis Southwestern, with headquarters in St. Louis, has expressed a willingness to enter into negotiations with C. W. Hobson, Dallas, and associates, representing the Texas Electric Railway interests, with the view of converting the Dallas to Greenville division into an electric interurban line. The City Commission has also interested itself in the proposition. The electric power for operating both lines will be furnished by the Texas Power & Light Company, an allied corporation of the Texas Electric Railway. The former company has a power transmission system that extends from the Red River to Taylor, more than 300 miles and covering a big scope of territory of East Texas. It plans to extend its electric power system to Austin and San Antonio.

Offers to Arbitrate St. John Questions

J. J. Bodell, Providence, R. I., representing the firm of Sanderson & Porter of New York City and holders of the common stock of the New Brunswick Power Company, operating the street railway in St. John, N. B., and suburban communities, offered to submit to a board of arbitration the issues in dispute between the company and the city. These are whether the company or the city shall distribute the hydro-electric current in St. John from the hydro-electric station of the New Brunswick Electric Commission; and the price asked for the assets of the company in a proposed sale to the city. The proposal for arbitration was placed before the City Council and defeated by four votes to one. The only member of the board to vote in favor of arbitration was Mayor McLellan.

Employees Start Pension Fund Association

Organization of a Pension Fund Association has been undertaken by the employees of the Indianapolis (Ind.) Street Railway. Officials of the company are assisting in working out the details of the plan which interlocks with a sick and disability benefit fund that has been in effect for the last eight years and is a step in a plan to establish a guaranty for the employees of the company to make employment a safe vocation, beneficial socially and economically. The company has no part in the association except to help put it on a working basis and to assist in its administration. With the support and control in the hands of the employees, the membership also is limited to employees of the company. The management of the association is in the hands of a board of directors, selected by ballot, one from each station and department. The association now has a membership of more than 700. The pension fund for old age and disability purposes is being established by the payment of dues of $1 a month from each member. Details as to the age limit for service, or disability from age and percentage pension payments based on length of service are to be worked out before the organization is completed.

News Notes

Dismisses Complaint.—The Pennsylvania Public Service Commission has dismissed the complaint against the Dubois Traction Company, the United Traction Company and the State Highway Department. It holds that it has no jurisdiction to compel the removal of a track from the west side of a street to the center and to pave with concrete between the rails. No crossing is involved. The complaint was filed by Sandy Township, adjacent to the city of Dubois.

Unusual Ending to Wage Issue.—The Gary & Southern Traction Company, operating between Gary and Crown Point, Ind., recently announced a wage reduction amounting to 10 cents an hour as a necessary step in the continued operation of the road. The employees explained that they could not accept the proposed cut but agreed to assume one-fourth of the cut. The result was that the Chambers of Commerce of both Gary and Crown Point, together with the company, assumed the other three-fourths reduction.

Shortage of Men Noted.—The attention of William Jerome Kuerts, Street Railway Commissioner, has been directed to the difficulty the Cincinnati (Ohio) Traction Company is having in getting men to operate its cars. For the first time since the war the traction company's waiting lists at the various carhouses have become exhausted and the company has been compelled to advertise for men. It is believed that the expense connected with being outfitted for such a position has something to do with the shortage of men.

Seek Provision for Subway Route.—A resolution calling upon Mayor George P. Carrel's Committee on Street Railroads of Cincinnati, Ohio, to embody in any recommendations it may make on the traction situation a provision for a definite understanding between the city of Cincinnati, Cincinnati Street Railway and the Cincinnati Traction Company as to the future of the canal subway route has been received by Mayor Carrel from the Federated Improvement Association. Under the resolution the committee is asked to embody in any proposed amendments a contract between the three agencies under which the traction company would bind itself to purchase the subway at a definite price, or to lease it at a definite price, and then operate the loop when completed. The resolution was presented by Eli Frankenstein, attorney, and adopted by the association at its last meeting.

Financial and Corporate

I. R. T. Case Heard

Commission Reserves Decision on Application for New Security Issues Under Reorganization Plan

The New York Transit Commission on Oct. 17 reserved decision on the application of the Interborough Rapid Transit Company for authority to pledge $27,570,000 bonds as security for ten-year 7 per cent gold notes, to pledge $32,032,000 of bonds as security for an issue of ten-year 7 per cent gold notes, to issue $34,330,000 of 7 per cent notes, and for authority to issue $10,500,000 of 6 per cent gold notes.

There was no opposition to the applications. Only a handful of persons were present. Assistant Corporation Counsel Edgar J. Kohler, representing the city, asked for certain conditions to be provided by the commission if it approves the applications. These provided for a 5-cent fare and representation of the city on the voting trust under the reorganization plan. Chairman McAneny assured Mr. Kohler that the city was amply protected as regards the 5-cent fare, and the other points he had made would be duly taken under advisement.

PLAN EXPLAINED

Grayson M.-P. Murphy and A. N. Anderson, head of the bond department of J. P. Morgan & Company, both testified as to the desirability of the applications being granted as being part of the reorganization plan. Colonel Murphy, who is chairman of the Interborough-Metropolitan bondholders' committee and chairman of the syndicate which will market the $10,000,000 notes issue, told how the syndicate had fixed 5½ per cent as its commission.

The two bond issues are asked as the pledged security for the $32,032,000 issue of 7 per cent notes which will supplant the 8 per cent note issue which had been extended from September of 1921, to Sept. 1, of this year. The smaller issue is a brand new issue and will be devoted to the paying off arrears to the Manhattan elevated lines, to the purchase of 350 new cars and other necessary outlays and obligations.

James L. Quackenbush, counsel for the Interborough Rapid Transit Company, in opening the proceedings recounted the company's difficulties in the past few years and how the present plan of adjustment had been brought about in strenuous efforts made to avoid a receivership of the company. He said that the extension of the notes asked for would get rid of the receivership proceedings still before the Federal Court. The $10,000,000 gold notes would go to pay arrears due to the Manhattan elevated line, buy 350 new cars and meet other expenses. The 8 per cent notes, amounting to $38,144,400, would be replaced by the ten-year 7 per cent upon paying 10 per cent in cash, leaving the security the same as at present and giving the noteholders the chance of converting their notes into pledged bonds at 80 for the first three years, 85 for the next three years, and then 90.

Judge Julius M. Mayer in the Federal District Court at New York, on Oct. 13, confirmed the sale of 339,128 shares of the capital stock of the Interborough Rapid Transit Company, disposed of at public auction on Oct. 10 by James Sheffield, trustee in bankruptcy and special master of the Interborough Consolidated Company, to a committee representing 92 per cent of corporation's shareholders for $1,760,000.

Protest was submitted by Alvin I. Hobbs in behalf of the dissenting shareholders. Judge Mayer, confirming the sale, declared the interest of all stockholders was equally protected, and that he believed the sale to be the only solution for those holding the stock eventually to realize return on it.

The hearing on the application for a receivership for the Interborough brought, about a year ago, by the Centinental Securities Company of which Clarence H. Venner is the head, has been postponed again by Judge Julius M. Mayer in the Federal District Court. Acting upon a stipulation entered into by all parties to the suit, Judge Mayer set the hearing for Oct. 24.

Voting Trust for Interborough Stock

In order to carry out the provisions of the plan of readjustment of the affairs of the Interborough Rapid Transit Company, New York, N. Y., calling for the election of directors to represent the public authorities, a voting trust has been established consisting of Grayson M.-P. Murphy, Guy E. Tripp and Frank L. Polk. The voting trust is to continue in force until Oct. 1, 1927.

After the plan of readjustment has been declared operative it is proposed to increase the number of directors from fifteen to eighteen. Of this number nine are to be designated by a committee representing stockholders, three by the Transit Commission, three by the committee representing the Interborough first 5 per cent bonds and three by a committee representing Manhattan Railway shareholders.

For stock of the Interborough, which is now in the hands of trustees, voting trust certificates or scrip to the aggregate par of $33,912,800 will be issued and distributed among holders of the Interborough-Metropolitan 4½ per cent bondholders participating in the plan.

Receivership Lifted

Columbus, Newark & Zanesville a Going Line—Rate Question to Be Given Immediate Consideration

Receivership of the Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, formerly a part of the Ohio Electric Railway system, was dissolved by Federal Judge John E. Sater at Columbus, Ohio, on Oct. 11. The company has been reorganized and is now operating as a going concern according to John S. Bleecker, vice-president and general manager of the road. Officers of the reorganized company are President, Charles Day, of Day & Zimmermann, Philadelphia; J. S. Bleecker, vice-president and general manager; F. A. Healy, secretary and treasurer.

In addition to the traction lines between Columbus, Newark and Zanesville, the company operates the Columbus, Buckeye Lake & Newark Traction Company and the Zanesville Light & Power Company, which supplies railway service, light and power to Zanesville, as well as electric railway service in the city of Newark. General offices of the company are located in Springfield, Ohio, in conjunction with the general offices of the Indiana, Columbus & Eastern Traction Company, which was also a part of the former Ohio Electric system.

P. A. Berry, Columbus, served as receiver for the company which was operated under the direction of Day & Zimmerman, Philadelphia public utility operators, and continues under the same general management with Mr. Bleecker as active directing head.

Mr. Bleecker announced that the company will at once take up with city officials of Newark and Zanesville proposals affecting the operation of the lines in those two cities, especially as regards the matter of rates, in an effort to avoid some of the difficulties which forced the company into the hands of a receiver two years ago.

Mr. Bleecker said that the traction company's physical condition has been bettered by the expenditure of about $150,000 for improvement of properties during the period.

Outstanding bonds of the company total $4,704,000 which represents first and second mortgages on the property. Prospects for immediate payment of interest on the bonds are not very bright, Mr. Bleecker said, but he voiced confidence that eventually payment would be made.

Receiver Berry expected to file his final report in the federal court on Oct. 20.

Operates Under New Name.—The Lake Superior District Power Company has taken over the Ironwood & Bessemer Railway & Light Company, the Ashland Light, Power & Street Railway and the Big Falls Water Power Company. The railway property in Ironwood, Mich., is now operating under the name of the Lake Superior District Power Company.

Reorganization Progress Made in St. Louis

Interests at Work There See Need for Valuation Around $75,000,000—Securities Now Outstanding Total $103,000,000—North American Company Controlling Common Stock Expected to Participate in Readjustment

COMMITTEES of security holders of United Railways, St. Louis, in frequent conferences, have about concluded that in order to lift the receivership and reorganize, it will be necessary to have a valuation around $75,000,000 and a new franchise for a long term. Appeal may be made to the Missouri Legislature in January in the interest of the company, in addition to the negotiations with the city for proper franchises.

In a general way it is understood that the reorganizers are basing their figures on a Public Service Commission valuation of at least $65,000,000 with the idea of adjusting their estimate to whatever valuation is fixed. A general estimate of $5,000,000 is made of the amount needed for immediate improvements, making the total estimated capital under a reorganization something like $70,000,000, not including a possible commission of 10 per cent for reorganization and floating the new bonds. With all the necessary allowances made the capital would be increased to something like $77,000,000 according to one financier, but this would be reduced to approximately $73,000,000 after allowing for the amount of cash now held by the company.

The belief is current that the North American Company would be willing to finance the reorganization, taking over the railways. Recently the North American through the Union Electric incorporated as the North American Edison Company in Missouri with a capital stock of $90,000,000 and has pending negotiations for the purchase of the East St. Louis & Suburban Railway lines. This with the control of the Keokuk dam and the construction of an $8,500,000 power plant, will add to the financial standing of the North American in St. Louis.

The great problem facing the North American or any other concern that takes over the United Railways is the stock adjustment. According to a statement made some time ago by Colonel A. T. Perkins, manager for the receiver, the stock and bonds outstanding amount to $103,000,000.

Steps in the reorganization, after a valuation has been determined by the Public Service Commission, probably will take the following course:

> Applications for a franchise for fifty years or the enactment of legislation giving the company the right to use the streets for an indeterminate period, with the city reserving the right to take over the company at any time in consideration of reimbursement of the investors on the basis of the fixed valuation.
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> Foreclosure on the United Railway 4 per cent bonds by agreement of all interests.
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> A bond issue of about $15,000,000 to take up the $6,000,000 of underlying bonds and $4,300,000 of receivership certificates; the remainder, $4,700,000, to provide for improvements and extensions of service and other essential costs.
>
> A second bond issue, possibly of $30,000,000, to take up the other bonds.
>
> Issuance of necessary preferred and common stock.

It is expected that holders of the underlying bonds and receivership certificates will receive dollar for dollar. The other investors will take losses in proportion to the difference between the fixed valuation as finally made and the capitalization, which is about $103,000,000.

Actual control of the United Railways will be involved in the reorganization. Control is now vested in the North American Company, by virtue of that company owning 200,000 shares of the common stock and controlling other securities sufficient to give it a majority in the directorate. It is said that North American can muster enough votes at any time to give it eight of the eleven directors.

The directors and their interests are:

R. L. Warner, Boston, and John F. Dulles, New York, representing the 200,000 shares of North American.

John I. Beggs, Milwaukee, and his son-in-law, Richard McCulloch, St. Louis, former president of the company, who have large holdings of Transit 5's, United 4's and some preferred stock.

J. K. Newman, New Orleans, and F. O. Watts and A. J. Siegel, St. Louis, representing large preferred stock interests.

Murray Carleton, St. Louis, United 4's and preferred.

Henry S. Priest, St. Louis, Transit 5's.

Alanson D. Brown, St. Louis, Transit 5's and preferred.

A. L. Shapleigh, St. Louis, representing the corporation but not a security holder except for one share of stock to qualify him for the directorate.

The foregoing directors are usually grouped in voting as follows: Warner, Dulles, Beggs and McCulloch, for North American interests: Watts, Siegel and Newman for the preferred stock investors; Carleton, Priest and Brown, for the Transit 5's, and Shapleigh, neutral.

The committee at work on the plan of reorganization is headed by Mr. Watts and is composed of the following other men: Breckinridge Jones and John Shepley, representing United 4's; G. W. Wilson, Transit 5's; Judge Priest Transit 5's for Philadelphia interests; Herman Stifel, Suburbans; Mr. Watts, preferred stock; Mr. Shapleigh, the corporation, and Henry H. Pierce, New York, the common shares.

The North American is said to have paid $4,000,000 for its common stock. In addition it has $1,300,000 invested in bonds of the Cass Avenue lines and $1,000,000 in the Lindell Railway's extension bonds, giving it a total cash investment of $6,300,000.

A successful reorganization of the company, said Mr. Watts, who is president of the First National Bank, St. Louis, must contemplate the expenditure of from $2,000,000 to $4,000,000 in improvements and extension of service as investors would be reluctant to put new money into the railways in their present condition. Mr. Watts said:

> There must also be a new franchise, preferably one giving a right to use the streets for an indeterminate period, with the city having the option to take over the company at any time on condition that investors be reimbursed on the basis of the valuation to be fixed by the Missouri Public Service Commission. This valuation ought to be around $75,000,000. Anything under that will make it difficult to refinance. I do not see where capital could be obtained on a valuation of $50,000,000 or $60,000,000. I would not put a dollar into the enterprise on such a low valuation.
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> Bonds on a low valuation would carry a high rate of interest, which would be very costly to the farepayers of St. Louis. For example, bonds bearing interest of an average of 7 per cent would have to be issued on a $60,000,000 valuation, whereas 6 per cent securities would do for a $70,000,000 or $75,000,000 valuation. It is an incontrovertible fact that the public eventually pays for everything, and this difference of 1 per cent in interest on $60,000,000 would be $600,000 a year. The public should be saved this burden.

Rolla Wells, receiver, has held several conferences with the reorganization committee. He says any reorganization must contemplate a long-time franchise, street car service at cost and the construction of a subway in the not far distant future from the downtown district to Vandeventer Avenue or beyond to relieve the growing traffic congestion.

Mr. Wells favors a valuation just to the investors. While he would not say what he thought it ought to be, he said that $64,671,281.14 of actual cash had been invested in the properties since the consolidation of 1899. He added that this figure does not include any allowance for the expenses incident to the consolidation of the independent properties into the United Railways in 1899—costs which, he said, probably would bring the total investment to $75,000,000 or $78,000,000.

The bankers point out that any reorganization must be based on the valuation to be fixed, and nothing definite can be accomplished, until the Public Service Commission acts.

When this is likely to be, none would hazard a guess, but it is expected that the commission will act within the next few months.

Expert accountants for the State Public Service Commission in a report made to the commission on July 27, 1920, placed the valuation of the United Railways property at $47,035,120.61. At that time, the United Railways records showed a book value of $101,436,776.

J. L. Harrop, chief engineer for the commission, reported to the commission, Feb. 10, 1921, that the reproduction value of the United Railway property, in services of the public within the city, would be $47,254,355. He stated that the cost, depreciated to represent the physical condition of the property at that time, was $34,285,531.

An inventory made for the United Railways by W. B. Bennett, Milwaukee, submitted to the commission Oct. 21, 1921, stated that the actual cost of the property, as constituted Sept. 30, 1921, was $52,249,166, and that the replacement cost of the property would be $103,637,556. F. W. Doolittle, employed by the company, figured the property and plant account of the United Railways, as of Dec. 31, 1920, at $101,916,798.

C. E. Smith, consulting engineer for the city, testifying before the State Commission, gave his estimate of the entire value of the United Railways property as $40,000,000. He said he gave great weight to actual cost, less depreciation, and to the book value less the depreciation reserve, and that he did not consider the face value of stocks and bonds. The valuation fixed by the State Board of Equalization for the company's state taxes for 1922 was $44,267,880.

Receiver Appointed for Chicago & Interurban

Cement roads and the advent of the automobile truck have brought about the doom of the Chicago & Interurban Traction Company, according to a voluntary petition filed on Oct. 11, leading to the liquidation of the affairs of the $3,000,000 concern. The interurban railway runs from Sixty-third and Halsted Streets, Chicago, to Kankakee, Ill. W. W. Crawford, secretary of the company, who has been connected with the property for a good many years, has been named receiver.

Exactions of union labor are also given as a contributing factor in the collapse. The company has announced that it plans to put a lower wage scale into effect on Oct. 16 and the employees of the company have voted not to accept the wage reduction offered. However, it is expected that the new scale, which averages 64 cents an hour, will receive further consideration by the men. The employees of the company are members of the union to which the men of the Chicago Surface Lines belong and they have been paid the union scale without regard to the earning ability of the road.

In July the company defaulted in the payment of interest on $1,896,000 of corporate bonds, according to the petition, and a power and light bill for $75,000 fell due at the same time. The report for the fiscal year ended December, 1921, showed that the company fell short by about $2,000 of meeting its operating expenses of $412,000. With interest and taxes the total deficit was $116,463. The proposed wage reduction will mean a decrease in operating expenses annually of about $30,000 and will give the company a fighting chance for recovery.

The towns of Blue Island, Harvey, Glenwood, Chicago Heights, Crete, Monse, and Bradley are affected by the receivership of the Chicago & Interurban. The road passes through all of them and for some of the towns it furnishes the principal means for transportation. Some of the spurs of the Kankakee line had already been discontinued and it is possible that the decision of the receiver may result in a discontinuance of the entire service. The present receivership is the fourth since 1893.

Detroit United Resumes Cash Dividends

At a recent meeting in New York of the directors of the Detroit (Mich.) United Railway an announcement was made that dividends had been resumed again on a basis of 6 per cent. The resumption comes after eighteen months, the last cash dividend having been paid in March, 1921. Then three stock dividends of 2½ per cent were declared, but only the first was allowed to be paid by the State Utilities Commission. The Detroit United Railway paid 5 per cent in 1912, advanced the rate to 6 per cent in 1913, 7 per cent in 1916 and 8 per cent in 1917, maintaining this rate until March of last year.

Authority for Private Sale Sought

Application for authority to sell at private sale the property of the Springfield Terminal & Railway Company, operating the Springfield, Troy & Piqua Traction line in Ohio, was filed on Oct. 18 in the Federal Court at Cincinnati. The application was made by receivers George H. Whysall and Williams Harman. It is the result of vain efforts to dispose of the properties of the line. An order was entered by the court directing a hearing before Federal Judge John E. Sater in Columbus on Oct. 26 on the application. The receivers in their petition allege the property is being operated at a loss and that continued operation will result in future losses.

Prospects for B. R. T. Reorganization Improved

So many conflicting rumors have been current about the proposed reorganization and readjustment of the Brooklyn Rapid Transit System that Federal Judge Mayer has deemed it appropriate to state what is in progress. The court agrees that it is desirable, of course, that the receivership should be ended as soon as practicable; but explains that the various legal and financial problems are different in many respects from those which were presented by the Interborough Rapid Transit Company situation.

The B. R. T. consists not only of subway and elevated roads but also of surface roads and thus the groups of security holders and creditors who must be consulted before any plan is finally presented are more numerous than in the case of the Interborough.

In discussing the matter the court said in part:

> The question involved has been under study for some time and outlines of plans for reorganization are now being prepared by different groups. These proposed plans when drafted will be the subject matter of conference and, in due course, the situation will be taken up with the Transit Commission.
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> In view of what was said by the court and various counsel at the hearing at the beginning of the receivership, the court has no doubt that any plan ultimately submitted will make just provisions for claims of tort creditors, that is, death or personal injury claims.
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> While the court has fully appreciated the hardship suffered in many instances by tort creditors, the delay in disposing of these claims has been due to the legal complications necessarily incident to the receivership. It is hoped, however, that these creditors will not sell their claims to speculators. Not only are the interests of the tort creditors receiving the attention of the court, but from early in the receivership the tort creditors' committee has been untiring in its efforts to secure a just and fair distribution of these claims.
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> Fortunately the increase in the net earning of the B. R. T. system has made the winding up of the receivership a practical question and, while it is impossible to predict when that result will be attained, the time has come when efforts to that end have been seriously undertaken.

Dividends Resumed After Two Years

The directors of the Nashville Railway & Light Company, Nashville, Tenn., have authorized preferred and common stock dividend payments. B. C. Edgar, vice-president and general manager, says that no dividends have been paid since 1919 as all net earnings had been used for rehabilitation purposes. The payment of these dividends have been made possible at this time, he says, by the recent Tennessee financing. This financing, which effected the consolidation of the companies controlled by the Tennessee Railway, Light & Power Company, has been followed in these columns.

Finance Terminal Building

The Salt Lake Terminal Company, Salt Lake City, Utah, expects to offer shortly $150,000 of 6 per cent first mortgage bonds to finance the construction of the proposed electric railway terminal at South Temple and West Temple Streets. The bonds are a part of a $1,000,000 issue authorized some time ago for the perfection of terminal facilities for the Bamberger Electric and the Salt Lake & Utah Railroads in Salt Lake City. Of the amount authorized $350,000 has been issued and the contempleted action will bring the amount outstanding to $500,000.

The bonds mature on June 1, 1935, carry interest at 6 per cent, payable semi-annually, June 1 and Dec. 1, and are first mortgage bonds on the holdings of the Terminal Company. Also they are guaranteed, both as to principal and interest, by the Bamberger Electric and Salt Lake & Utah Railroads, whose combined average earnings for the past five years, after all operating and fixed charges and taxes, amount to $185,000 annually.

Reorganization Plan Explained

In the opinion of E. A. Robert, president of the Quebec (Can.) Tramways, a reorganization of the property is needed in the interest of both the security holders and customers. Five objectives would be sought in effecting such reorganization. They are: (1) To alter the present system of dividing the various branches of the company's business; (2) to facilitate the progressive expansion of the company's business; (3) to enable the company to extend considerably its activities; (4) to provide means for economically financing extensions and developments; (5) to enable the reorganization of the enterprise to be effected in the best interests of the public and the security holders of the company. He said that a detailed survey of all branches of the company's activities had been made to determine what its real needs were and that the above requirements had been decided upon as a necessity in the furnishing of efficient service. He said that as a preliminary step an application would be made at the forthcoming session of the Legislature in Quebec for the incorporation of three companies, the Quebec Power Company, the Quebec Gas Company and the Quebec Tramways Company.

Fewer Passengers Carried in September

The Public Service Railway, Newark, N. J., carried a total of 34,032,864 passengers in September, this being 337,291 fewer than the number carried during August, when the company reported a total of 34,370,155, it was shown in a report filed in the Federal Court at Trenton. During November, 1921, when the first report was filed under the order of Oct. 17 last, the company carried a total of 31,842,317. The number of passengers paying the base fare of 8 cents in September totaled 12,321,709, as compared with 12,380,801 for the preceding month. The number of tickets or tokens sold in September at the rate of four for 30 cents was 13,988,502, compared with 14,231,338 in the preceding month. The number of transfers issued in September for 1 cent each was 5,831,990, compared with 6,014,142 for the preceding month.

Bankers Purchase Utah Securities

The Utah Securities Corporation has sold to the Electric Bond & Share Company and Hayden, Stone & Company $2,200,000 par value of Utah Power & Light Company 7 per cent preferred stock. The proceeds of this sale, with moneys on hand in the treasury, will pay off the $6,952,000 of Utah Securities 6s which have just matured. This will retire the last of the total issue, which was $27,790,000, leaving Utah Securities Corporation free from funded debt and floating debt. It has no preferred stock and has a substantial cash balance in its treasury. The Utah Securities Corporation now owns $3,099,000 of the second preferred 7 per cent stock and the entire $30,000,000 common stock of the Utah Power & Light Company. The electric light and power and the gas properties of the Utah Light & Traction Company are leased to and operated by the Utah Power & Light Company.

Financial News Notes

Issue Approved.—Issuance of $36,000 of 6 per cent serial promissory notes by the Trenton & Mercer County Traction Corporation, Trenton, N. J., has been approved by the New Jersey Board of Public Utility Commissioners. To secure the notes a chattel mortgage issued to the Mechanics National Bank of Trenton was also approved.

Wants to Issue Bonds.—The Electric Short Line Railway of Minnesota recently filed with the Interstate Commerce Commission an application for authority to issue $660,000 in fifteen-year 5 per cent bonds, which, with other funds, will enable the road to build 44 miles of new line extending west from Hutchinson, Minn., toward Clara City.

Balance of Income Increases.—The Reading Transit & Light Company, Reading, Pa., for the year ended Aug. 31, 1922, reports an operating revenue of $2,940,505, against $3,013,791 for the year ended Aug. 31, 1921. The balance of net income for the 1922 period after deducting the dividend provision on preferred stock was $214,520, against $55,471 in 1921.

$583,658 Surplus.—The gross earnings of the Republic Railway & Light Company and subsidiaries, Youngstown, Ohio, for the twelve months ended Aug. 31, 1922, were $7,510,670, against $7,913,685 for the twelve months ended Aug. 31, 1921. The 1922 balance for depreciation, dividends and surplus amounted to $583,658, against $253,508 for the period ended Aug. 31 a year ago.

Net Income Increased.—The Philadelphia (Pa.) Rapid Transit Company increased its net income from $980,543 for the nine months to Sept. 30, 1921, to $1,365,129 for the same period this year. Passenger revenue showed a decrease, the 1921 figure amounting to $30,825,268, against $30,645,611 for January-September, 1922. The total passengers carried for the nine months of 1922 were 623,972,005, against 622,163,877 for the same period a year ago.

Foreclosure Sale Fixed for Nov. 15.—The property of the Maumee Valley Railways & Light Company, of which R. G. Mills, cashier of the Home Savings Bank, is receiver, will be sold at sheriff's sale at Toledo on Nov. 15. The company leases its rolling stock and buys power from Toledo Edison Company, and other central station companies in this neighborhood. It operates a line on both sides of the Maumee River Valley connecting Toledo with the towns of Maumee and Perrysburg.

Talk of Abandoning Line.—There is a possibility that Bucyrus may lose the Cleveland & Southwestern line running between Bucyrus and Galion. C. E. McKisson, attorney for the receiver, was in conference with the County Commissioners at Bucyrus regarding a new franchise for the line. The commissioners were ready to grant the franchise, but reserved the right to fix the fare as in the old franchise between Bucyrus and Galion. It is understood McKisson told them that if they did not waive this right the road between Bucyrus and Galion would be abandoned.

Interurbans Valued at $30,785,000.—According to the *Wall Street Journal* the Michigan Utilities Commission has appraised the 626 miles of Detroit United Railway interurban lines less depreciation at $30,785,000. It is said the commission expects to use these figures as a base for rate making at the hearings to begin next month. The report of the company as of Dec. 31, 1921, carried all its property at $59,502,000. Thirty lines were since sold to the city for $19,850,000 leaving property appraised by the commission at $39,000,000 on basis of last balance sheet.

Change Made in Assessed Valuation.—The State Tax Commission, at the suggestion of the State Board of Equalization of Missouri, has made reduction to some extent in the assessed valuation of the Springfield (Mo.) Traction Company. The reduction, it was stated, was made because of a misapprehension on the part of the commission as to the length of time the fifty cars of the company have been in service. The commission has valued these at $4,000 each on the theory that they had been in service only a year or two. Later it was shown that with few exceptions the cars have been in service twelve years. The change in assessment will make a difference in the total taxes that the Springfield company will have to pay.

Mortgage Bonds Offered.—A syndicate headed by the Guaranty Company of New York and including Harris, Forbes & Company, Halsey, Stuart & Company, Inc., and Brown Brothers & Company, is offering $7,000,000 Pennsylvania Power & Light Company first and refunding mortgage bonds, series BB, 5 per cent, to be dated Oct. 1, 1922, and due Oct. 1, 1952. The bonds are offered at 92¾ and interest, to yield about 5½ per cent. The company operates electric power and light and gas properties in an extensive territory in Eastern Pennsylvania and has taken over the Lycoming-Edison Light Company, the Williamsport Electric Company, the Jersey Shore Electric Company, the Jersey Shore Street Railway, the Lock Haven Electric Lighting System and the Montoursville Passenger Railway.

Traffic and Transportation

Ordinance Recommended

A Proposed Amendment to Franchise of Virginia Railway & Power Company Calls for Six-Cent Fare

The committee on streets of the City Council of Richmond, Va., has recommended the adoption of an ordinance amending the franchise of the Virginia Railway & Power Company to discontinue the sale of certain tickets and to charge a fare of not more than 6 cents for each passenger. After the ordinance has been advertised for ten days it may be acted upon by the Common Council of the City Council. If adopted by the Common Council it may then be considered by any meeting of the Board of Aldermen called for the purpose after such adoption or at its first regular meeting after adoption by the Common Council.

TICKET PROVISIONS REVIEWED

The ordinance authorizes the Virginia Railway & Power Company for and during the period of three months next ensuing after the approval of the ordinance to discontinue the sale of two labor tickets for 5 cents, good from 6 a.m. to 7 a.m., Monday to Saturday inclusive, and to discontinue the sale of six tickets for 25 cents, good from 6 a.m. to 8 a.m., Monday to Saturday inclusive, and to charge, except as herein provided, a fare of not more than 6 cents for each passenger. The second provision says that the company shall continue the universal transfer system and the sale and acceptance of the so-called school tickets to be sold and delivered to pupils as required under its present franchises, and shall provide for the sale on its cars of five tickets for 30 cents and at its office books of fifty tickets for $3. A provision stipulates that any and all tickets sold by the company at the rate of two for 5 cents or at the rate of six for 25 cents and in the hands of the public at the time the ordinance takes effect shall be valid and shall entitle the passenger to all rights guaranteed by provisions of the original franchise under which the ticket was sold.

None of the provisions of the ordinance are to become effective until the Virginia Railway & Power Company has filed with the City Clerk its acceptance of all provisions.

According to Section 4 of the proposed ordinance the terms and provisions of the ordinance shall automatically expire three months from the date of the approval without action on the part of the city of Richmond or upon the grant by the city to the company and the acceptance by the company of a new blanket franchise covering its present lines in the city of Richmond, if such grant and acceptance happen during such three months and prior to the expiration thereof, and upon the expiration of this ordinance the said company and its successors shall thereupon be bound by all of the provisions of the franchise now owned or under such blanket franchise as the case may be, provided the company recognizes as a condition the obligation imposed by a franchise now owned by it in South Richmond as to paving prescribed by sections of an ordinance of the city of Manchester. Section 6 explains the object of this ordinance as follows:

> 6. The intent of this ordinance is to grant the rights and privileges authorized by it for three months after its approval or until the grant and acceptance of a blanket franchise within such three months as aforesaid, and during that period to suspend but not repeal, the provisions contained in the various street railway franchises owned and operated by the Virginia Railway & Power Company, which are in conflict with the provisions contained in this ordinance, but it is especially ordained that at the expiration of the said period the provisions of the existing franchises owned and operated by the Virginia Railway & Power Company, which are so suspended, shall automatically be and become binding upon the said company, its successors and assigns, unless a new blanket franchise has been granted and accepted as aforesaid, in which case the company shall at the expiration of said period be bound by the provisions of such blanket franchise; provided, however, that the said company in consideration of the rights and privileges granted by this ordinance hereby recognizes and admits as one of the conditions and obligations imposed upon it under the street railway franchises now owned by it in South Richmond, the obligation and duty as to paying imposed and prescribed by Sections 3 and 4 of an ordinance of the city of Manchester, approved Oct. 9, 1885, as amended, respectively, on April 12, 1900, and Nov. 12, 1895, which said amendments appear as Sections 3 and 4 of Chapter 73 of the ordinances of the city of Manchester of 1905.

Pass Sales Increase in Tacoma

Weekly pass sales on the lines of the Tacoma Railway & Power Company, Tacoma, Wash., have been as follows:

First week, July 24-30	7,007
Second week, July 31-Aug. 6	8,380
Third week, Aug. 7-13	8,251
Fourth week, Aug. 14-20	8,400
Fifth week, Aug. 21-27	8,551
Sixth week, Aug. 28-Sept. 3	8,689
Seventh week, Sept. 4-10	8,286
Eighth week, Sept. 11-17	9,189
Ninth week, Sept. 18-24	9,342
Tenth week, Sept. 25-Oct. 1	9,747
Eleventh week, Oct. 2-8	9,748

The following table covers the first seven weeks operation with the pass.

Average ride per pass per week	27.59
Average ride per pass per day	3.94
Average ride per pass per weekday	4.07
Average ride per pass per Sunday	3.15
Apparent average revenue per ride on pass	3.62c.
Average fare per ride on pass (including allowance for transfers)	4.71c.

Patrons of the company have expressed their appreciation of the advantages of the pass in many ways and it is anticipated that within a few weeks the 10,000 mark in passes sold will be reached. It is said that the company expects to continue the pass at least through the winter. Reference has been made previously in the *Electric Railway Journal* to the fact that twenty-five buses are being operated at a 5-cent fare in Tacoma in competition with the lines of the railway.

Seven-Cent Fare Charge Upheld

The New York State Court of Appeals has unanimously affirmed the decision of the Appellate Division of the Supreme Court sustaining the right of the Public Service Commission to establish a 7-cent fare on the local lines of the International Railway in Buffalo. George Clinton, Sr., retained by the city as special counsel in the proceedings, says he will appeal to the United States Supreme Court to test the validity of the franchise held by the International fixing a 5-cent fare. It is declared that it may be a year before the case reaches the United States Supreme Court. The municipal authorities hold that in view of the franchise limitations the commission has no authority to grant a 7-cent fare.

United Railways Contemplates Bus Operation

Receiver Wells of the United Railways, St. Louis, Mo., is contemplating the use of buses in lieu of extensions of certain lines into several suburban districts, which have become congested, and which he is unable to reach with trolley lines under the receivership. A formal protest was recently filed by Manager A. T. Perkins of the United Railways against the granting of a permit by the Board of Public Service of St. Louis to the United States Bus Transit Corporation for the operation of motor buses on downtown and cross streets now occupied by the tracks of the railway.

In protesting Receiver Wells said that the railway desired to promote transportation which would result in increased comfort, convenience and economy to the people of St. Louis, but that the granting of such permit would have the effect of decreasing the comfort of the majority of the people. He said that the bus line would "cut into the cream of the business" and would make it less possible for the United Railways to maintain service at a uniform reasonable fare on all its lines. It was also cited that the United Railways paved the streets between its tracks, and on either side of the rails, and it was predicted that the bus company would use this paving without any adequate compensation to the city.

Bus Feeder Proposed for Alhambra

A survey has just been made by the passenger traffic manager of the Pacific Electric Railway with the City Manager of Alhambra, Calif., a suburban city of some 14,000 population, and served by two of the interurban electric lines of the Pacific Electric Railway. The survey was made with a view of establishing two possible motor bus lines to be operated in the city of Alhambra as feeders for the railway's lines.

It was stated by the railway representative that he would recommend at once the establishment of the local bus lines, and when such service was authorized by the directors of the company, then immediate application would be made to the State Railroad Commission for permission to put the service into effect.

The initial equipment would consist of three modern motor buses, to be operated on a 6-cent local fare, with the privilege of transfer to the cars of the electric line. Two routes for the buses are proposed. This bus service is not intended to interfere with any proposed intercity service, and according to the city officials would not require a franchise, only a permit to operate being necessary.

Fares Cut in Wheeling

Fare reductions ranging from 6 to 25 per cent, and the elimination of the present zoning plan, have been announced by G. S. Wills, general manager of the Wheeling (W. Va.) Traction Company. The order affects the entire system. It will not be adopted, however, until the new schedule of tariffs has been approved by the State Commission. This may not be until December.

The "nickel ride," abolished in 1920, will return, according to the statement issued by the company, when tickets are purchased, otherwise the cash fare in the city will be 8 cents.

The company admits in the statement that the new rates resulted from the belief that if the fares were lowered patronage would increase. In the event the experiment in lower fares fails to stimulate travel, application will be made by the company for increased tariffs.

As a further effort to induce use of the cars by the public, special strip tickets for 50 cents, good for ten rides, will be placed on sale by the company. These tickets may be used at any hour and without restrictions as to destination.

In conjunction with the movement started by the railway came the announcement from the Ultimate Bus Company that its schedule of fares would be reduced to meet the new rates of the railway.

Mayor of Seattle Gives View on Weekly Pass

Mayor E. J. Brown of Seattle, Wash., in considering means of reducing carfare on the Seattle Municipal Railway to 5 cents, is investigating the weekly pass system. In this respect he said:

> The city must not take any step which will not be in accord with its obligations to the holders of the $15,000,000 of street railway bonds, but I am inclined to think that 5-cent fare without transfers will now bring a greater revenue than the 8⅓-cent fare, especially if we could combine a 5-cent fare with the weekly $1 pass system.
>
> Such passes would be good for rides on all lines while they are effective. This plan would make the railway so convenient and inexpensive that people could not afford not to ride on city street cars. We would regain our short haul business, and much of the business we have lost to private automobiles. These questions, however, are matters for the City Council to decide.

Cincinnati Prepares for One-Man Car Operation

Cincinnati's first one-man cars will be on the tracks of the Cincinnati (Ohio) Traction Company within the next month. That announcement has been made by William Jerome Kuertz, Street Railway Commissioner. At a conference between the street railway commissioner and officials of the company recently the statement was made by Walter Draper, vice-president, that before the end of the present year seventy-five one-man cars would be in operation in Cincinnati.

The seventy-five cars are now under construction in the shops of the Cincinnati Car Company at Winton Place. They will be of a type that may be operated either by one man or a crew of two. There is a likelihood that they will be operated as one-man cars during the "lean" hours of the day and night and as two-man cars during the rush hours. The cars are of the very newest type, Mr. Kuertz stated, and will be found to be a big improvement over the cars now in operation. The overhead system of the traction company is being prepared for the new cars by readjusting the wires to eliminate pull-downs as much as possible. This will save the motorman, who will also be required to act as conductor, a great deal of trouble. A. Benham, general manager of the traction company, said that it has not been determined as yet on what lines the one-man cars will be first operated.

Men employed to operate one-man cars will receive 5 cents an hour additional.

No Announcement on One-Man Territory Extension

B. E. Tilton, vice-president and general manager of the New York State Railways, Syracuse, N. Y., would not disclose any information on enlarging the one-man car territory in his city. He did say that until he had seen a copy of the commission's order approving of one-man cars and had had an opportunity to study the order with President Hamilton no announcement would be made. It is expected that many lines now operating with two-men cars will be changed to one man. The order of the commission was reviewed in the *Electric Railway Journal* issue of Sept. 30.

Candidates Quizzed on Fare Question

Candidates for office in the approaching election in Connecticut have been asked to state their views on the 5-cent fare question in New Haven. The questionnaire, sent out by the Grand Avenue Business Men's Association of New Haven, asks for the candidate's view on the necessity of business methods in public utilities, the wiping out by the public of a deficiency when the public receives no benefit of surplus over agreed earning rate, and on the establishment of a bureau of statistics which would gather reports independently for the state. The fourth question asked is: "What is your purpose (if elected) relative to the high cost of trolley fares in the State of Connecticut whose charges are in excess of any other State in the country?"

The questionnaire was signed by Charles E. Griffith, who recently stated that the Connecticut Company was showing discrimination in not reducing its fares in New Haven. This was a reply to a statement by Lucius S. Storrs, president of the company, that the Grand Avenue residents had shown selfishness in their demand for a rerouting of cars.

Transportation News Notes

One-Man Cars on More Lines.—Commissioner Cann of Toledo recently announced that one-man cars would be placed in operation on the Cherry Street and East Broadway lines of the Community Traction Company on Oct. 16. The cars will be of the pay-enter type with both entrance and exit at the front end. One-man cars have been in use on the Bancroft line more than three months.

Freight Service Resumed.—Trolley freight service between Allentown and Philadelphia, suspended more than a year ago when the Philadelphia (Pa.) Rapid Transit Company abrogated its agreement with the Lehigh Valley Transit Company, has been resumed. It is understood that while the Philadelphia Rapid Transit Company was not an active participant in the new arrangement, it has leased its freight stations in Philadelphia to the Public Service Transportation Company, which will co-operate with the Lehigh Valley company. The Public Service Commission has approved the arrangement.

Protest Fare Charges.—Corporation Counsel Wilbur of Portland, Me., has forwarded a petition to the Public Utilities Commission protesting against the high rates charged by the Cumberland County Power & Light Company. The present charge on the railway division of the Cumberland County Power & Light Company is an 8-cent coupon rate with a 10-cent cash fare. It is expected that the City Council of South Portland will be asked to join in fight for reduced fares. In answer to the complaint of the special committee of the city government seeking a reduction in fares the company has filed a statement with the Public Utilities Commission asking a dismissal of the charges. The company claims that even the present fare schedule is not sufficient to provide a fair return. Further, the railway claims that there has been no change of conditions in connection with the operation of the system that warrants a reduction in rates.

Personal Mention

Salina Road Successful

W. E. Smither Continues as Manager There Under Change in Control, First Since 1911

Kansas has a little electric road that has long been almost entirely a family affair. The property is located at Salina. There are only 7.25 miles of track, but the road stands high, very high, with the public. Among the principal owners of the property for a decade now have been H. C. Smither and W. E. Smither, the one president and the other secretary-treasurer and general manager. Recently, however, along came J. J. Wiesendanger looking for a paying investment. He hadn't far to seek and now Mr. Wiesendanger controls the Salina Street Railway and is its president. With a true eye to the main chance Mr. Wiesendanger has announced that W. E. Smither will continue in the job that he has so acceptably filled for many years.

And why shouldn't he? The Salina company has never increased its fare beyond 5 cents. Moreover, the road has been operated profitably. Salina has only about 15,000 inhabitants. The town is fairly well spread out. It is only twelve blocks, however, from the union station to the business center. Mr. Smither's philosophy was that so far as Salina was concerned local folks figured a nickel was just a nickel and that they would pay a nickel to ride a few blocks, but would not pay any more. In fact, the real thrifty among the company's patrons—and Kansas is a place of thrift—ride for a fraction more than 4½ cents, for the company sells tickets at the rate of twenty-two for $1 and a $5 book of tickets for $4.50. Although the fare was kept constant, the pay of the employees was raised from 15 and 20 cents an hour, the rate in effect before the war, to 35 and 40 cents an hour. These are only some of the facts. Most important, perhaps, of all as recording the measure of success of the company is the record of the payment of a dividend of 8 per cent in 1921 on the $160,000 of stock of the company.

A road with only nine cars is certainly not in luck when the jitneys arrive on the streets. These pests didn't overlook Salina. When the jitney began to develop as a possible rival of the Salina Street Railway, officials of the company did not seek to bar them from the streets. The Smither management tried out the jitneys as an adjunct of the railway company's business. A motor bus operated along a main street in Salina, paralleling one of the car lines part of the distance, but running beyond that line's terminus to the Country Club. Now a motor bus is being operated on a half-hour schedule to a section of the city not reached by the railway lines. Bus fares are 10 cents. The buses are said not to be making any money, but they have proved a valuable adjunct and have kept the good will of the public for the railway.

H. C. Smither bought the line in 1911. It then consisted of a gasoline motor car and a narrow gage track, built with 30 lb. rails. The original line operated from the old railroad station to Kansas Wesleyan University, 3 miles. Since then it has been entirely rebuilt, equipped for electric operation and extended considerably.

When called seven years ago by his father to enter the traction business, Warren E. Smither—for that is the full name of the secretary, treasurer and general manager of the Salina Street Railway—was a farmer. He had been a bank clerk a short time. That comprised his business experience. The elder Mr. Smither said to his son:

W. E. SMITHER

"You start in now to learn the railway business, because some day you're going to have to manage this line."

Learning from the ground up, Mr. Smither put in a year at the carhouse as a laborer—washing cars, repairing brakes, building track, fighting the battles of keeping cars running in big snowstorms.

Mr. Smither was twenty-six years old then. He knows everything connected with the operation of his small traction company. Undoubtedly one of the major items in the success of the 5-cent fare in Salina is Mr. Smither's self-imposed apprenticeship and the direct contact he maintains now with every activity. He sees personally that everything needed is done rightly.

As secretary-treasurer of the board of directors, Mr. Smither is no mere figurehead. He collects fares from the cash boxes on the cars. In fact, it is said that he performs all the duties of a company treasurer, purchasing agent, general manager, lineman, bookkeeper, shopman, motorman—anything, wherever needed most.

Wallace Muir, Lexington Lawyer, to Lead Claims Association

Wallace Muir, attorney in Lexington, Ky., will direct the destinies of the American Electric Railway Claims Association for the coming year. Mr. Muir was elected president at the final meeting of the association in Chicago on Oct. 5.

A long list of accomplishments in the legal, political and electric railway world is attached to Mr. Muir's name. He is a well-known personage in the association, for since 1911 he has attended all except one of the association meetings, has served on several committees, including the executive committee, and filled the chairs of first, second and third vice-president. He thus proves himself interested in activities of all electric railways, though his special allegiance is to the Kentucky Traction & Terminal Company. He has general supervision of the claims department of this company and tries all cases for it. He is connected in the same way with the Kentucky Utilities Company, Lexington. This work he has carried on since 1911.

Mr. Muir was born near Lexington, and at an early age moved to the city, where he has since continuously resided. He attended the State University at Lexington for three years, then took up the study of law at Washington & Lee University, Lexington, Va., and in 1900 was graduated from Central University of Richmond, Ky., now Center College, Danville.

After graduation he entered the law office of Bronston & Allen, which was one of the leading law firms of Kentucky. Later he opened private offices in Lexington. He has enjoyed a large practice and has been associated with some of the leading cases in Kentucky during the last ten years. In addition to his private practice he has served as city attorney and city solicitor and commonwealth's attorney of the Twenty-second Judicial District.

Mr. Gaboury on Long Leave of Absence

Arthur Gaboury, superintendent of the Montreal (Que.) Tramways, has been granted a long leave of absence in order to allow him to recuperate his health. His condition has improved, but further rest is necessary to obtain a complete cure. Provisionally, A. J. Gadoua, formerly claims agent, has been appointed to act as superintendent, and C. H. Shaw, formerly assistant to Mr. Gaboury, has been appointed assistant superintendent of transportation, with supervision over the movement of passenger and freight traffic.

Mr. Gaboury, after completing his college course at St. Laurent, entered the employ of the Montreal Street Railway in 1894 as conductor and later served as motorman, thereby gaining a practical knowledge of the transportation business. In 1901 he was appointed assistant inspector, and soon thereafter became depot clerk of the central carhouse. A few months later he was transferred to the new carhouse on St. Denis Boulevard, as chief clerk, having charge of the suburban line to Sault au Recollet.

In 1903 the claims department was separately organized, and Mr. Gaboury was put in charge as claims agent, which position he retained until 1906, when he was made assistant superintendent. A year later he was appointed superintendent, which position he has held to the present time.

Mr. Gaboury was president of the Canadian Electric Railway Association in 1920, and is now treasurer of the association. In the affairs of the American Electric Railway Association Mr. Gaboury has always been active and at the recent meeting in Chicago he was made second vice-president of the Transportation & Traffic Association.

B. F. Bardo Promoted

B. F. Bardo, formerly engineer of power plants of the New York, New Haven & Hartford Railroad, has been appointed superintendent of electric transmission. He will be in charge of operation and maintenance of the wire plant between New York and Cedar Hill. His headquarters will be at Cos Cob, Conn. Mr. Bardo has been with the New Haven since 1914, when he entered the office of the superintendent of power. A year later he was appointed inspector of power plants, and in November, 1917, was made engineer of power plants. He was graduated from Cornell University in 1913 with the degree of mechanical engineer. For more than a year, and until he joined the New Haven company, he was in the testing department of the General Electric Company at Schenectady, N. Y., and Pittsfield, Mass. Mr. Bardo was born in Wilkes-Barre, Pa., in 1889.

Dr. Stratton President of Boston Technical School

Samuel Wesley Stratton, for twenty-one years director of the Bureau of Standards in Washington, D. C., was elected president of the Massachusetts Institute of Technology on Oct. 11. Dr. Stratton, before joining the Standards Bureau, was a professor of physics at the University of Chicago. Under his leadership the bureau has grown from a small office of weights and measures, with three or four employees, to a large organization, with a staff of more than 900 employees. A dozen buildings are now needed to house the bureau, which is the largest government laboratory in the world. The bureau is now a center of scientific research for many government purchasing departments and for industry. Miniature manufacturing plants of textiles, ceramics, glass and paper have been established to determine the best industrial processes.

Dr. Stratton was graduated from the University of Illinois in 1884. The honorary degree of doctor of engineering has been conferred on him by the University of Illinois, the University of Pittsburgh, the University of Cambridge and by Yale University.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Glasgow Rail Contract Awarded to American Company

A proposal by Glasgow Tramways committee to accept a tender at £15,325 by the United States Steel Products Company was confirmed by the Town Council on Aug. 24, but not until the matter had been debated for a long time. The English tenderers were three Sheffield firms, Hadfields, Edgar Allen & Company and the Titan Trackwork Company, their lowest offer being £18,262. The English tenders were within a few hundred pounds of each other.

The Labor members of the Council objected to the order going to America as they alleged that the conditions of employment in the United States did not comply with the Glasgow Corporations fair wages clause. It was also contended that in view of the large amount of unemployment the work should be kept at home.

In support of the recommendation it was stated that the committee had received from the United States Steel Products Company a guarantee as to hours of work and wages paid. Bailie McWhirr, chairman of the Tramways Committee, in urging that the lowest tender should be accepted, said that the conditions and wages were better in the American than in the English steel works. As to relieving unemployment, the question was asked: Why should Glasgow pay £3,000 to help the working people of Sheffield? The offer made by the American firm was accepted by thirty-three votes to thirty-one.

1,500,000 Volts Generated

Further advances in the generation of extremely high electric potentials have been announced by the High Voltage Engineering Laboratory of the Pittsfield Works of the General Electric Company, Schenectady, N. Y. Several combinations of voltages have been obtained and studied for the first time, the highest being 1,500,000 volts, which is half again as much as that recorded in this laboratory a year ago.

In this combination one terminal with 1,000,000 volts was connected above ground and the other with 500,000 volts below ground.

One million two hundred and fifty thousand volts, single-phase, was also produced and 1,000,000 volts, three phase, with neutral grounded.

A million and a half volts arced between needle points 14 ft. apart. One million volts, three phase, formed a blazing triangle 9 ft. on a side between needle points.

Such advances, the Pittsburgh laboratory said, are not only of importance in electrical research and the design of apparatus for the more economical transmission of electric power over long distances but also open up new fields of research for the physicist, astronomer and physician.

Increased Industrial Activity Seen in Demand for Surplus Freight Cars

According to reports just received by the American Railway Association from the railroads of the country all the surplus freight cars have been needed to move business. This growing demand for transportation facilities presents a situation the like of which has not been noted since November, 1920, and is due to increased industrial activity.

For the week ended Sept. 15, according to reports filed, the railroads had pending requests from shippers for 85,906 freight cars which could not be immediately filled. This was an increase of 18,007 cars over the number on Sept. 8. Within the same time there was a decrease from 43,168 to 4,476 in the number of surplus freight cars that are scattered throughout the country.

Fourteen Substations at Work

The contract for building the fourth automatic substation of the Los Angeles (Cal.) Railway is to be awarded soon. The new station will be located on Hobart Street. A 1,000-kw. converter manufactured by the General Electric Company, will be installed.

Completion of the West Adams unit will give four automatic substations on the system. The first one was placed in the company's Vernon yards. With the other stations that require the attention of operators, the company will have fourteen substations generating power necessary for street car service.

Metal, Coal and Material Prices

Metals—New York	Oct. 17, 1922
Copper, electrolytic, cents per lb.	13.812
Copper wire base, cents per lb.	15.625
Lead, cents per lb.	6.55
Zinc, cents per lb.	7.175
Tin, Straits, cents per lb.	34 875
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$5.625
Somerset mine run, Boston, net tons	4.30
Pittsburgh mine run, Pittsburgh, net tons	3.625
Franklin, Ill., screenings, Chicago, net tons	3.25
Central, Ill., screenings, Chicago, net tons	2.375
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	6.50
Weatherproof wire base, N.Y., cents per lb.	16.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N.Y., cents per gal.	91.50
White lead, (100-lb. keg), N.Y., cents per lb.	11.625
Turpentine, (bbl. lots), N.Y., per gal.	$1.45

Rolling Stock

Louisville (Ky.) Railway is very busy in its shops just now in converting a lot of its old single-truck cars into one-man cars. Deliveries on the large order for cars placed a few weeks ago are expected to start shortly.

United Electric Railways, Providence, R. I., has placed an order with the Osgood Bradley Car Company, Worcester, Mass., for 100 cars at an average cost of $12,000 a car. A few months ago the railway at Providence placed an order for fifty cars with the same manufacturer.

Reading Transit & Light Company, Reading, Pa., is constructing in its own carhouse an all-steel framework car designed for both city and suburban service. This modern light-weight car will probably serve as a standard whenever additional equipment is required in the future.

Track and Roadway

Northwestern Ohio Railway & Power Company, Oak Harbor, Ohio, has about completed the work of renewing the road bed between Toledo and Port Clinton.

Philadelphia, Pa.—The City Council's transportation committee has authorized the extension of a trolley line on Ogontz Avenue from Champlost Avenue to Old York Road.

Los Angeles (Cal.) Railway has started the reconstruction of Spring Street between First Street and the Temple Block. New ties, ballast and rail will be installed.

Public Service Railway, Newark, N. J., will change the grade and relay the tracks on High Street, Burlington. In Harrison the company will lay asphalt between the tracks on Harrison Avenue.

Fort Wayne, Ind.—The Board of Public Works has signed the Indiana Service Corporation franchise for a single track line on Putnam Street and has referred the matter to the City Council for action.

Eastern Texas Electric Company, Beaumont, Tex., is building an extension of its lines on Magnolia Avenue to the grounds of the East Texas Fair Association. The extension will be completed in time for the fair this fall, it is announced by officials of the company.

Houston (Tex.) Electric Company has been denied permission to extend its Studewood car line north on Reagan Street through Woodland Heights. The City Council expressed a willingness to grant permission for the extension to be built out Watson Street, one block west of Reagan.

Dallas (Tex.) Railway will work over numerous street crossings in carrying out an agreement made with the Dallas Automobile Club, according to Richard Meriwether, vice-president and general manager. Automobile drivers had complained that certain street crossings were rough and made automobile travel difficult and unpleasant.

Cincinnati & Dayton (Ohio) Traction Company through George P. Sohngen, receiver, has been authorized by the Ohio State Court of Appeals to expend $1,500 for the construction of a temporary bridge over the Two-Mile Creek near Hamilton, Ohio, so that cars of the traction company can be run through without the transferring of passengers and freight. The old bridge was washed away during the recent high water.

Power Houses, Shops and Buildings

Jacksonville (Fla.) Traction Company is installing oil burning equipment at its power plant on Riverside Avenue.

Boston (Mass.) Elevated Railway is erecting a small carhouse on P Street.

Public Service Railway, Newark, N. J., contemplates the erection of a new carhouse at Harrison.

Boston (Mass.) Elevated Railway has awarded the contract to the National Engineering Corporation, Boston, to erect a three-story 120 x 41-ft. reinforced concrete storehouse building on George Street and Sullivan Square, Boston.

Interstate Public Service Company, Indianapolis, Ind., is making extensive improvements in its power distribution system on the interurban line between Indianapolis and Louisville, according to L. M. Brown, general superintendent. A new automatic substation has been installed at Langdon, 10 miles south of Indianapolis, and another of the same type, costing $30,000 will be installed at Azalia, 10 miles north of Seymour, Ind. The manually operated substation at Reddington, Ind., will be moved to Southport, Ind., and consolidated with the one in operation there at this time. More even distribution of current is the object of the company in making the changes. The substations will feed in current taken from the transmission system.

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., recently began the operation of a new General Electric 30,000-kw. turbo-generator at the Lakeside power station. This unit brings the capacity of the station up to 70,000 kw., the two turbines in the original plant being of 20,000-kw. capacity. This new unit represents an investment of approximately $1,500,000. The new structure consists of the turbine house and the switch house, both being additions to the first unit, extending the westerly part of the original building to the south. In building the original unit provision was made for boiler capacity and water service, fuel capacity and handling apparatus for a plant of 200,000 kw. capacity, so no new extension was needed to that part of the plant.

Trade Notes

Walter S. McKee has resigned as vice-president and director of the American Manganese Steel Company and will develop the business of the Inland Engineering Company of Chicago, of which he is president.

Maine Concrete Railroad Tie Company, Corinna, Me., has recently been incorporated under the laws of Maine, to manufacture concrete railway ties, etc. The capital stock of the concern is $10,000. Sidney S. Smith, has been chosen president; H. C. Milliken, treasurer; and Jason F. Small, secretary.

Johns-Pratt Company, Hartford, Conn., manufacturers of Noark fuses and protective devices, Vulcabeston packing and Insulation and Johns-Pratt molded products, announces the appointment of George V. W. Ingham as eastern sales manger for the Electrical Division. He will make his headquarters at the New York office of the company in the Liggett Building, 41 East Forty-second Street. Mr. Ingham is well known in the electrical wiring device field, having held until recently the position of Eastern sales manager of the Bryant Electric Company, with which he was associated for eleven years. Prior to that Mr. Ingham was associated with Pass & Seymour, Inc., as western sales agent.

New Advertising Literature

Herman H. Sticht & Company, New York, N. Y., has issued Bulletin No. 115 descriptive of The Standco Megohmer.

Worcester Brush & Scraper Company, Worcester, Mass., has issued a catalog describing its high grade engineer supplies, foundry supplies, etc.

Pyrene Manufacturing Company, Newark, N. J., has issued Bulletin No. 3, describing the Parker process which changes the surface of any kind of iron or steel so that the rust problem is eliminated.

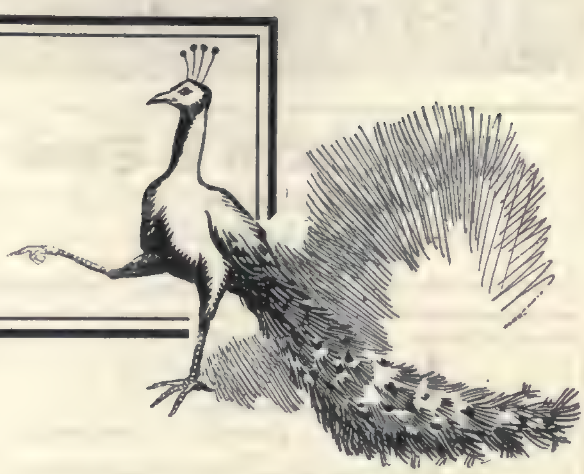
American Abrasive Metals Company, New York, N. Y., sales representative for the United States and Canada of the Carborundum Anti-Slip Tile, has issued a catalog describing in detail the new non-slip tile for walking surfaces. A specification guide for the setting of the tile both in new and repair work, together with size and shapes table of standard sizes and prices of the same, is included in the catalog.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued a new publication, reprint 125, incorporating an address on light-weight interurban cars delivered before the Central Electric Railway Association convention, by F. E. Wynne, manager of the Railway Equipment Engineering Department. The publication discusses the advantages of the use of light-weight cars for interurban service over the heavier type of double-truck cars.

On the 5-yard Line!

Every so often the crucial game is saved by the ability of one particular man to tackle the on-rushing opponent, and drag him down to a stand-still—

before he hits the goal!



That's why—

PEACOCK BRAKES

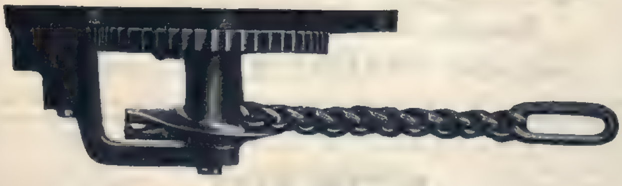
Make Good in the Railway Game!

They can be depended upon to stop the car *before it hits* the object or obstacle on the track.

Peacock Brakes are fast; they have great reserve power and their chain winding capacity is sufficient to take care of any amount of slack. But above all else is their reliability, like that of the guard who saves the football game for his team.

It is that reliability factor which makes Peacock Brakes the most dependable equipment for electric railway cars, whether used as the regular service brake, or merely for emergency conditions.

Investigate! Then specify—Peacock Brakes



Peacock Improved Brake

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative:

Lyman Tube & Supply Company, Limited, Montreal, Canada

Bankers and Engineers

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Manufacturers of Steel Structures of all classes, particularly
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THE P. EDWARD WISH SERVICE
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Street Railway Inspection
DETECTIVES
131 State St.
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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

SANGSTER & MATTHEWS
Consulting Accountants
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25 Broadway, NEW YORK
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LEADERS in the electri are interested in permanen made possible by DAYTON

These Men—

Are interested (1) in the lower cost of this track (2) longer service life (3) reduced track and paving repairs (4) reduced upkeep of rolling stock (5) less traffic noise (6) the good will that results from easy riding track.

DAYTON

railway industry
low cost track construction
RESILIENT RAILWAY TIES

The opposite page shows a group from the Railway section of the Wisconsin Utilities Association. These gentlemen are inspecting an installation of *Resilient Ties* on the lines of the Wisconsin Public Service Company at Green Bay.

There is much evidence of the constantly increasing interest among railway men, all over the country in this type of construction. Why? Simply because there are so many installations in service and so many going in and also possibly due to the fact that a large number of them are on some of our most successfully operated lines. The Dayton Resilient ties are practically and fundamentally right—if the opportunity hasn't arrived when you, too, can make a careful inspection let us send you convincing evidence. Just drop us a card telling us you're interested.

SAVE $6,000 A MILE

Accurate cost figures on hundreds of jobs throughout the country prove that Dayton Resilient Ties actually save $6,000 a mile over tracks laid with wood ties in concrete foundation and $2,000 a mile over track laid with wood ties in gravel ballast.

The Dayton
Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio

Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Resilient
TIE

cushion the shock on the rolling stock

Close-up of a Thermit insert weld installed in Milwaukee, where this method has been adopted on an extensive scale.

THERMIT INSERT RAIL WELDS

1. Eliminate the Joints.
2. Low First Cost; No More Than Other Joints.
3. First Cost is Last Cost.
4. Breakage Negligible.
5. Do Not Cup.
6. Last as Long as the Rail.
7. Make the Rail Last Longer.
8. Satisfactory Wherever Used.
9. In Use Ten Years.
10. Saves the Rolling Stock.
11. Pleases the Public.
12. Simple? Certainly!

Let Our Demonstrator Show You!

Metal & Thermit Corporation

120 Broadway, New York

PITTSBURGH CHICAGO BOSTON S. SAN FRANCISCO TORONTO

g'long
g'long
g'long

—Here comes the Emergency Wagon!

It has the right of way! The law recognizes that the restoration of traffic—and even life and limb depend on it.

You want it to come scooting along without delay. So issue TEXACO Gasoline, the volatile gas.

Then, when the driver steps on the accelerator, a lively stream of vaporized TEXACO Gasoline shoots into the cylinders and the truck's away.

The truck fairly leaps forward because of the quick pick-up of "the volatile gas."

And if you are also using TEXACO Motor Oil, you may be sure that the truck will run in winter, when most tie-ups occur. TEXACO Motor Oils flow freely in zero weather.

Keep the emergency truck fit.

Use **TEXACO GASOLINE** and **TEXACO MOTOR OIL**—for easy starting, quick acceleration and full power. Ready for any emergency.

And this is worth noting. The qualities that make TEXACO Gasoline so worth while in the internal combustion engine operate to make it the best gasoline for blow torches. Volatility, Fuel Value, Purity—mean ready atomization, high heat content and no danger of sediment blocking needle valves or spray holes.

So, then, you can understand why the sale of TEXACO Gasoline to Street Railways and bus lines is keeping pace with the enormous growth of our business in TEXACO Street Railway Lubricants.

Nor are the roads neglecting the other TEXACO products. They are using large quantities of

TEXACO KEROSENE

for stationary lamps, headlights and tail lamps, where the safety factor is important and where the oil must burn without crusting wicks or frosting glasses. It is also used for cutting grease and loosening rusted parts.

TEXACO SIGNAL OIL

for hand lamps. This is a compounded oil of excellent qualities and noted especially for long burning.

TEXACO 300 BURNING OIL

An uncompounded burning oil (made especially to meet the demand for high flash), used for some types of hand lanterns and stationary lamps.

Some of our best roads use TEXACO Petroleum Products all along the line.

TEXACO LUBRICANTS TEXACO GREASES TEXACO GASOLINE
TEXACO BURNING OIL

THE TEXAS COMPANY

DEPT. R. J. 17 BATTERY PLACE · NEW YORK CITY
HOUSTON - CHICAGO - NEW YORK
OFFICES IN PRINCIPAL CITIES

Desire Upholds Business

The basic changes that have taken place in business during the past year or more—specifically the change in price levels and price tendencies—have caused business men everywhere to think less superficially and more fundamentally about business.

Great basic facts which were but little realized, except by thinkers along economic lines, have now become clearer to the public at large, and to business leaders in particular.

One such fact is that Desire is the foundation of business. It is the desire of the people for any article of commerce that makes it profitable to produce it. When that desire fails all the agencies of its production must cease to operate.

This fact was considered academic until the nation-wide cessation of liberal buying made it a matter of cardinal importance, and the question of the hour became the means, if any, of restoring the popular desire to do business—the desire to buy.

It came to be seen that the public desire for the products of a business or an industry was the only real and permanent asset. Every other assumed asset became a liability when that desire subsided.

It is upon this basic fact that Advertising rests.

It is the function of Advertising to create desire.

The desire that is created by Advertising is always some specialized form of an elemental need. Elemental needs, in their simple form are the raw material out of which must be created the Demand for the products of industry. This Demand, in its turn, upholds civilization itself. It is the one necessary thing that inspires all human activity.

It is the function of Art and Industry to take the raw materials of nature and refine them into products that constitute Supply. It is the function of Advertising to take the raw materials of elemental need for food, shelter and clothing, and refine them into the desires for the finest products of Art and Industry, and these desires constitute Demand. Each function is as important as the other. And now the time has come when this fact is realized as never before.

[Published by the Electric Railway Journal in co-operation
with The American Association of Advertising Agencies]

An Account of SOME Account

Brake Pins and Bushings

may not show in the budget, but

they can loom up big in the accident account, even though you don't see them there.

The extra cost of Boyerized Brake Pins and Bushings is the veriest trifle compared with the thousands of dollars they can save through the prevention of one single, serious accident. Especially hardened, and finished with an enduring glossy surface, they not only make your surface safer but they more than save their own cost by lasting several times as long as untreated steel.

Today, hundreds of electric railways demand Boyerized equipment for the very first mile they run their new cars. Join the procession for the full line as follows—

The Boyerized Line—

Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
Boyerized Stag Brand Manganese Brake Heads

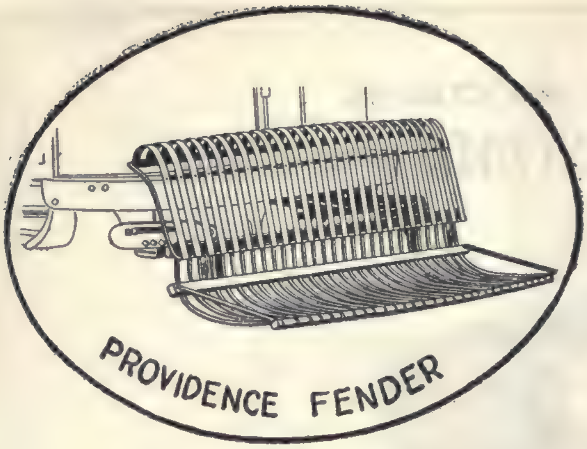
BEMIS CAR TRUCK COMPANY

Electric Railway Supplies

Springfield, Mass.

REPRESENTATIVES:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
J. H. Denton, 1328 Broadway, New York City, N. Y.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



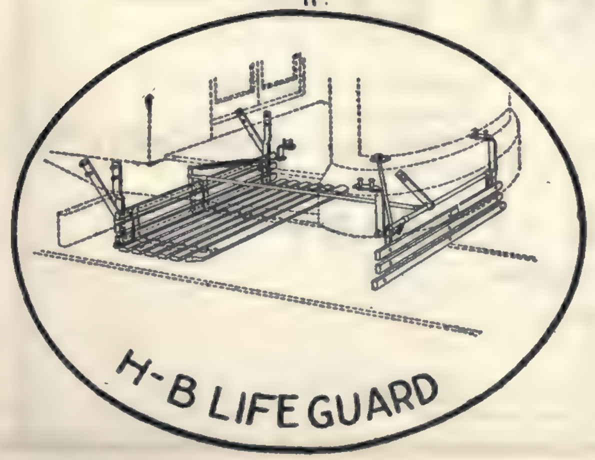
Every Car
Should be a "Safety" Car

When there are devices available at entirely reasonable cost, to safe-guard and protect human life, what excuse can be offered for not using them?

For years, Providence fenders for suburban service, and H-B Life Guards for city service, have been recognized as standard safety equipment for electric railway cars. By equipping with these best-known devices, you not only protect the public, but you protect yourself from the probability of heavy damage suits. The cost of the fatal accident, might pay for an entire equipment of H-B Life Guards.

Let us figure on your equipment

The Consolidated Car Fender Co.
Providence, R. I.
General Sales Agent
Wendell & MacDuffie Co.
61 Broadway, New York



Ripping off the sleet is easy!

It's merely a matter of having the right kind of equipment on hand at the right time, and having it in sufficient quantity to meet the worst conditions of winter weather that can possibly occur.

COLUMBIA

SLEET CUTTERS

Should be ordered now

Do not delay until the unexpected early storm cleans out your stock of sleet cutters. It's too late then, to wire somewhere for additional ones. Even a slight interruption of traffic will cause more loss of revenue than the cost of sleet cutters for a dozen winters.

Columbia Sleet Cutters are widely used, because they are most effective cutters and yet last longer in spite of burning arcs and hardest wear.

Write your order today

COLUMBIA 1892 MACHINE WORKS

The Columbia Machine Works
and Malleable Iron Company
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. Green, Sales Mgr., Brooklyn, N. Y.
E. Keller, Brooklyn, N. Y.
F. C. Hedley, Brooklyn, N. Y.
J. L. Whittaker, 141 Milk St., Boston, Mass.
E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.

Some other Columbia Specialties

Bearings
Gear Cases
Motor Coils
Trolley Wheels
Trolley Ears

Send for circulars

On the all-steel limited cars of the Interstate Public Service Company

MILLER TROLLEY SHOES

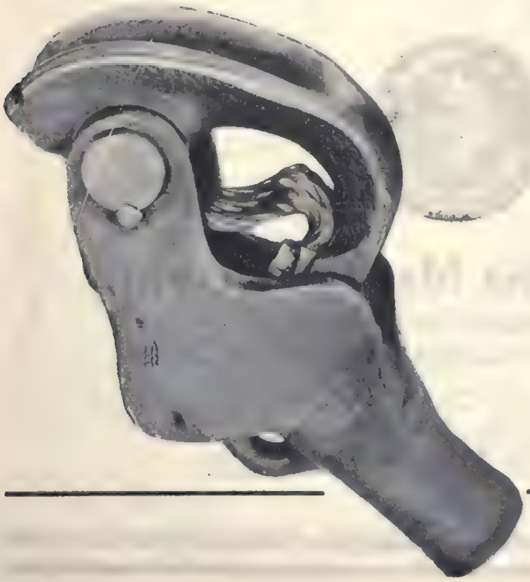
(Patented)

Are Giving Satisfactory Service

In the fast and fine limited service between Indianapolis and Louisville, Miller Trolley Shoes have been making an enviable reputation for reliability and economy. They have been using them since the spring of 1921 in this service.

Here's what they say about them—

"The shoes do not build up in the groove as was our trouble with trolley wheels. We have fewer dewirements with shoes as they stay with the wire much better than wheels. They do not wear the trolley wire faster. Reports from the Overhead Department show that no noticeable extra wear has been caused by the use of trolley shoes. We are well satisfied with the results obtained."



Why MILLER Trolley Shoes!

Because it is the MILLER Trolley Shoe which has been continuously in the field, with years of successful experience and established reputation behind it. Its special metal contact is the result of years of research work by expert metallurgists. Experienced engineers and practical railway men have developed its design and construction to its present high state of efficiency. It is of the MILLER Trolley Shoe, that railway men invite such recommendations as the above.

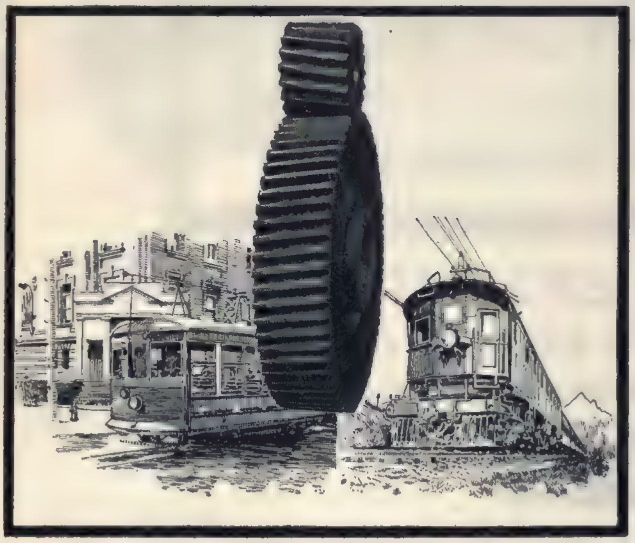
Try them

Miller Trolley Shoe Co.
Boston-21, Mass.

***Western Representative:*—Economy Electric Devices Co.**
1590 Old Colony Bldg., Chicago

Standard Helical Gears

7½° Helix Angle



Your gears warn you loudly when there is excessive vibration and wear.

Nuttall Standard Helical Gears so reduce vibration and noise that a Los Angeles engineer reported several cars as coasting which actually passed his observation post under power.

Nuttall B. P. Treatment so reduces wear that mileages in excess of 250,000 no longer excite any comment, and mileages up to 500,000 are possible.

You can dismiss the gear problem if you use Standard Helical Gears.

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

3
(Three)
Simple Parts

and only three parts, make up White's Porcelain Trolley Hanger. This is a big advantage in shortening the time and labor of installation and in lengthening the service life of the hanger.

WHITE'S
Porcelain
Trolley Hanger

consists of the sherardized malleable iron yoke, the heavy glazed porcelain insulator and the "stud"—a standard bolt, sherardized or furnished in bronze.

The illustration will convince you of the ease of installation and alignment. You can see that this hanger will give service, too—there is no possibility of the insulation "breaking down" or cracking.

We will send you a sample and it will tell its own story to you. Let us give you quotations on complete hangers or parts which we have in stock for

Immediate Delivery

T. C. WHITE
Electrical Supply Co.
1122 Pine Street, St. Louis, Mo.

—endurance!

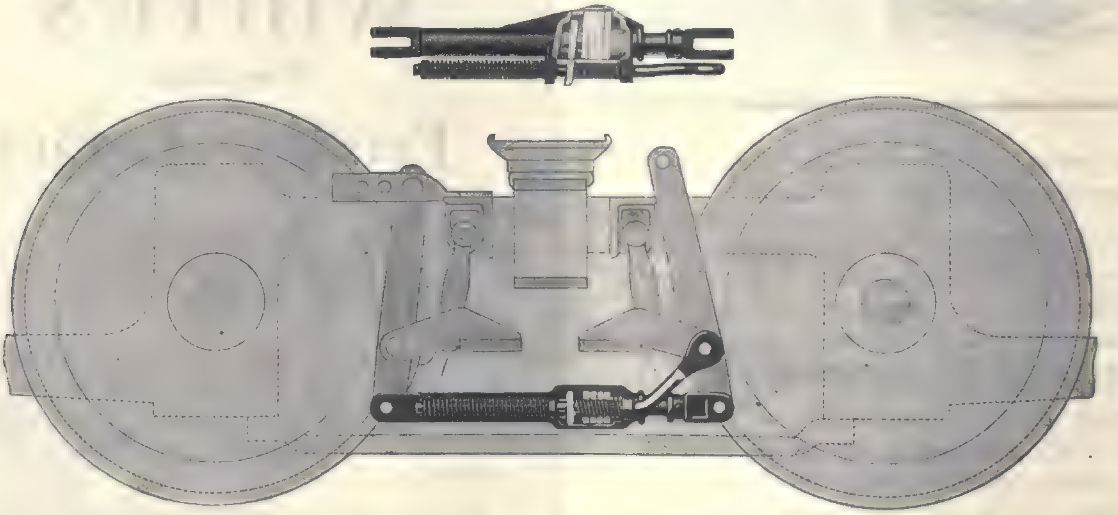
Chillingworth

One Piece Seamless Drawn Steel Gear Cases

Vibration and bumps are all in the day's work for Chillingworth Gear Cases. No rivets to loosen, no malleable iron to crack. They are

"Built for Service."

Chillingworth Mfg. Co., Jersey City, N. J.



GOULD AUTOMATIC SLACK ADJUSTER

Give 100% Brake Efficiency.
Gould Adjusters are made to fit any truck in place of turnbuckles.
Makes your car fit to run and remain in service.
Gould Universal Slack Adjusters are becoming standard on the leading railways of this country.

Gould engineers are pioneers in the world of *brakes, slack adjusters* and *automatic safety appliances.*

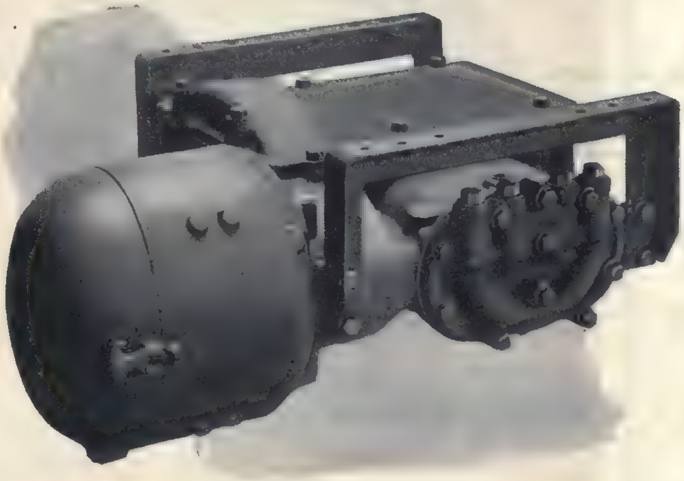
Get our figures for your new cars. We manufacture adjusters to fit any style of truck or brake rigging.

GOULD COUPLER COMPANY

30 East 42nd St., New York City **Works: Depew, N. Y.** **The Rookery, Chicago, Ill**

ALLIS-CHALMERS

AA-7B
Air Compressor



Compressor for Street Car Mounting

A single acting duplex compressor with crank case and cylinders integral. One-piece cylinder-head for both cylinders contains suction and discharge valves. Trunk pistons operated by connecting rods with bushings provided for taking up wear.

Heavily designed crankshaft of high-grade steel turns in journal bearings of ample proportions to insure minimum wear.

Herringbone Gears transmit power from motor shaft to crankshaft with practically silent operation.

Lubrication is positive and efficient. Connecting rods dip into the oil and splash reaches all working parts. Gears run in oil.

Send for Bulletin

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.

When you think of STEEL, think of

CARNEGIE

It is ever our constant endeavor to maintain, and build up where possible, the standard of quality and service by which Carnegie Steel Company has won the reputation it today enjoys.

Carnegie Steel Company

GENERAL OFFICES: CARNEGIE BUILDING, PITTSBURGH, PA.

Birmingham, Boston, Buffalo—DISTRICT SALES OFFICES—Chicago, Cincinnati, Cleveland
Denver, Detroit, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul
Export Representatives: UNITED STATES STEEL PRODUCTS COMPANY, New York City, London
Pacific Coast Representatives: UNITED STATES STEEL PRODUCTS COMPANY
San Francisco, Los Angeles, Portland, Seattle

1560

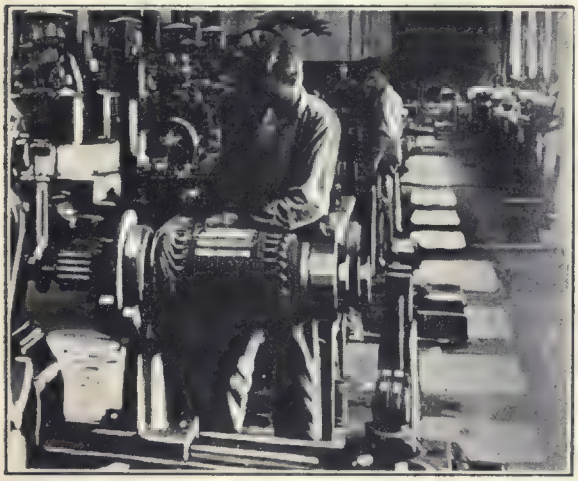
Have you noticed?

Any time, anyone, before any convention, has ever bragged of fine pinion records – the pinions always *happen* to be

Cincinnati "*Tool Steel*"?

And yet we are told other pinions are "just as good"!

Get better service from armatures with



IRVINGTON

Black Varnished Cambric

30% Higher Dielectric Strength
100% Better Heat Resistance
100% More Alkali and Acid Resistance
200% Better Aging Qualities
200% More Resistance to Oil.
Than Yellow Varnished Cambric

Send for samples

Irvington Varnish & Insulator Co., Irvington, N. J.
ESTABLISHED 1905

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Cleveland, O.

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Rochester, N. Y.

L. L. Fleig & Co.
Chicago, Ill.

F. C. Scofield
Toronto, Ont., Canada

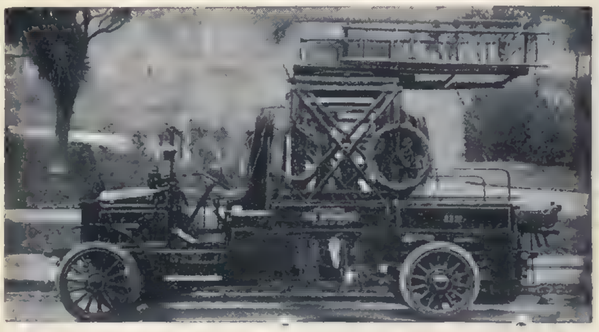
Drip Points for Added Efficienc

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000, Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.
Est. 1848—Inc. 1870



TRUCK WITH TOWER IN RUNNING POSITION

This 3-Section

TRENTON TOWER

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.
Trenton, New Jersey, U. S. A.

Utuyala

Utuyala, the native beer of the Kaffirs, is a strong man's drink.

Weak stomachs can't stand it.

Not that it has so much kick . . . but it is so full of dead water-flies and other choice debris that it is hard to swallow without chewing.

The theory of buying motor brushes haphazardly, without regard for the conditions they must serve, is just the opposite . . . *easy to swallow and a lot of kick afterward!*

Satisfaction follows the Morganite Way of *prescribing* the brush to fit the need.

Given the opportunity, we will prove that to you!

Morganite Brush Co., Inc.

Main Office and Factory:
519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co., 909 Penn. Ave., Pittsburgh

J. F. Drummey, 75 Pleasant St., Revere, Massachusetts

W. R. Hendey Co., Hoge Bldg., Seattle

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

Herzog Electric & Engineering Co., 150 Steuart St., San Francisco

Special Service Sales Company, 502 Delta Bldg., Los Angeles

Railway & Power Engineering Corporation, Ltd., 131 Eastern Ave., Toronto, Ontario, Canada

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
TRIPLEX

Arc Weld and Flame Weld

Send for new Rail Bond book

American Steel & Wire Company
CHICAGO
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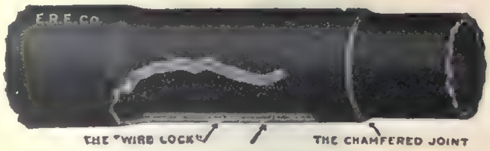
ELRECO TUBULAR POLES



COMBINE
Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE
TROLLEY WIRE
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
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American Electrical Works, Amelectric, Wires and Cables, Phillipsdale, R.I.
Reg. U. S. Pat. Office
Galvanized Iron and Steel Wire and Strand
Incandescent Lamp Cord

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams;
Cincinnati, Traction Bldg.; New York, 233 B'way.

"RIMCO" Insulated Pliers

"The only SAFE PLIERS for linemen and all high tension work"

Semi-soft rubber insulation bounded to metal by *Elchemco* process.

Tested and passed at 10,000 volts by The Electrical Testing Laboratories of N. Y. C.

Insulation cannot crack or work loose

Rubber Trade Rimco Mark Products Reg. U.S. Pat. Off.

Rubber Insulated Metals Corporation
50 Church Street, New York City, U. S. A.
Distributed by The Electric Service Supplies Co., and other distributors
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ANACONDA TROLLEY WIRE

ANACONDA COPPER MINING COMPANY
Rolling Mills Department
CHICAGO, ILL.

ANACONDA from mine to consumer

THE AMERICAN BRASS COMPANY
General Offices
WATERBURY, CONN.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way.
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, E. C. 4, 38-39 Upper Thames St.

Peirce Forged Steel Pins
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Your best insurance against insulator breakage

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Transmission Line and Special Crossing Structures, Catenary Bridges

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ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

INSULATED WIRES AND CABLES
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Automatic Signals
Charles N. Wood Co., Boston

Waterproofed Trolley Cord

Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE and ECONOMY.**

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

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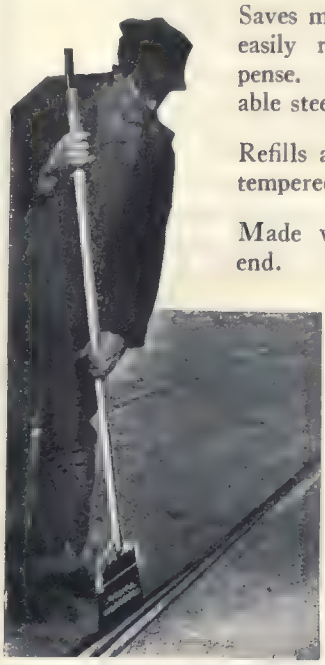
Detachable Steel Brooms

The Royal Worcester



Saves more than 200% as it is easily re-filled at trifling expense. This is the only detachable steel broom on the market.

Refills are made from the best tempered round steel wire.

Made with or without chisel end.

Steel heads are treated with Anti-Rust process.

Write for full details and quotations. It will pay you.

Worcester Brush & Scraper Co.
Worcester, Mass.

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Cross Ties: White Oak, Chestnut, and Treated Ties. Oak Switch Ties.

Prompt shipment from our own stocks.

Headquarters—Nashville, Tenn.
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Manufacturers of
Copper, Brass, Bronze Wires, Rods, Tubes
Colonial Copper Clad Steel Wire
Insulated Wire of all kinds
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Cable Terminals, Junction Boxes, etc.
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Rail Bonds

Brazed Bonds		Arc Weld Bonds	
Type ET Type EA	head of rail	Type AT-F Type AT-R Type AU	head of rail
Type EC,	web of rail	Type A,	base of rail

The Electric Railway Improvement Co.
Cleveland, Ohio

AUTOMATIC SIGNALS
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NACHOD SIGNAL COMPANY, INC.
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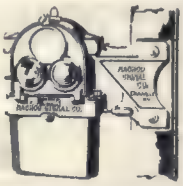
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Single-track block-signal protection
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Protection at intersections with wyes
Proceed signals in street reconstruction work

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Established 1881

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Successor
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Automatic Return Switch Stands for Passing Sidings
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Rail Bonds and Trolley Line Specialties
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Indianapolis Economy Products That Make Dollars "Grow"

Indianapolis Solid Manganese:
Frogs, Crossings, Mates and Tongue-switches. Super-quality material. Par-excellent designs. Gives many lives to one, of ordinary construction, and when worn down, CAN BE RESTORED by INDIANAPOLIS WELDING.

Indianapolis Electric Welder:
Efficient, Rapid, ECONOMICAL, Durable. Price, $2.00 (per day for three hundred days) thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

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Fluxated heat treated Metal Electrodes, insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untreated.

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Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and COUNTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

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are Pre-eminently "Money Savers," YES—"Money Makers" for Electric Railways.

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Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

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Steel Castings Converter and Electric
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SUPER-SEASONED FIBRE

Peerless Insulation Paper has 25 to 50 per cent higher electrical resistance.

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Hornflex Insulation Paper has no grain. Folds without cracking.

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Every Week

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
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IMPROVED ANTI-KICK BIG-HEEL SWITCHES
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Corrugated Culverts

"ACME" (Nestable) and IMPERIAL Riveted Corrugated Culverts. Made of anti-corrosive Toncan Metal. Write for prices.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
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FOR
CARBON ARC RAIL JOINT WELDING
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CARBON and METALLIC ARC GENERAL WELDING

Rail Welding and Bonding Co., Cleveland, O.

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to consult the

SEARCHLIGHT SECTION

of this issue

It may hold the very opportunity for which you have been seeking

If you do not find what you want, perhaps a small ad will help you.

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$5 or less per inch

UNDISPLAYED ADS
Positions Wanted—4 cents a word
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0168

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Design and Manufacture
of
Standara—Insulated—and Compromise Rail Joints

The Rail Joint Company
61 Broadway, New York City

BUCKEYE JACKS
high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.
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FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
Second and Diamond Sts., Philadelphia

PERFECT
MICANITE
INSULATOR
Reg. U. S. Pat. Off.

ELECTRICAL INSULATION

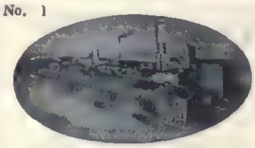
Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

Catalogs will gladly be furnished

MICA INSULATOR COMPANY
Sole Manufacturers of Micanite
Established 1893
68 Church St., New York
542 So. Dearborn St., Chicago
Works: Schenectady, N. Y.

8-F

No. 1



EST. 1865 AIMCo INC. 1916
"American"
INSULATING
MACHINERY
COMPANY
REG. U.S. PAT. OFF.
PHILADELPHIA PENNSYLVANIA U.S.A.

"American" Electric Railway Automatic Signals.
RECLAIMING MACHINES } for recovering
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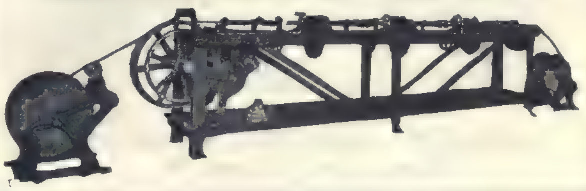

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

STERLING VARNISH

Manufactured by electrical engineers who will understand your insulating problems and render intelligent service. Noted for uniformity and quality. It will pay you to get in touch with

The Sterling Varnish Co., Pittsburgh, Penna.

Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Islands in the Indian Ocean. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

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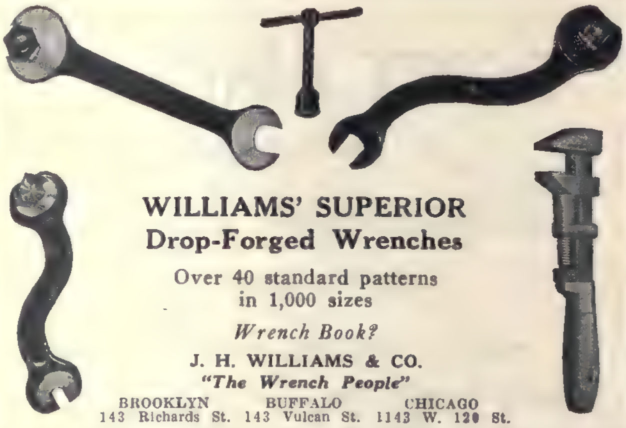
Railway and Power Engineering Corp., Toronto and Montreal.
G. F. Cotter Supply Co., Houston, Texas.



WILLIAMS' SUPERIOR
Drop-Forged Wrenches

Over 40 standard patterns
in 1,000 sizes

Wrench Book?

J. H. WILLIAMS & CO.
"The Wrench People"

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TULC
A
LUBRICANT

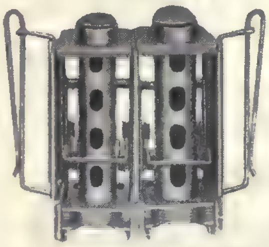
We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment.

The Universal Lubricating Co.
Cleveland, Ohio

JOHNSON Universal Changer



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The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels, to suit his personal requirements and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

Type R-10

International Registers

Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
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HEATERS

Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. **Write for details.**

The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

N-L

Indicating Signals
Mechanical Sanders
Ventilators, Smokestacks
Pneumatic Sanders
Selector Switches, Lanterns, etc.

THE NICHOLS-LINTERN CO.
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75% of the electric railways
use
B-V Punches

Send for Catalog

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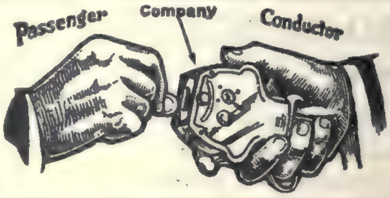

Direct Automatic Registration
By the
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Rooke Automatic Register Co.
Providence, R. I.

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DIFFERENT kinds of service require different modes of treatment. For years we have specialized on Catchers and Retrievers exclusively. We can satisfactorily meet every condition.

We can give you the Ratchet Wind, the Emergency Release, the Free-Winding Spring, the Drum Check, and other absolutely exclusive features.

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Brake Shoes
A. E. R. A. Standards

Diamond "S" Steel Back is the Best Type

Standard Patterns for

SAFETY CAR

D-67 for Narrow Treads
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Anderson Slack Adjusters
Genesco Paint Oils
Dunham Hopper Door Device
Feasible Drop Brake Staffs
Flaxlinum Insulation
Anglo-American Varnishes, Paints, Enamels, Surfacers, Shop Cleaner.
Johnson Fare Boxes
Peerless and Perry Side Bearings
Drew Line Material and Railway Specialties
Hartman Centering Center Plates
Economy Power Saving Meters
H & W Electric Heaters
Garland Ventilators
Pitt Sanders
National Safety Car Equipment Co.'s One-Man Safety Cars
Central Equipment Company's Hand Holds
Tnemco Paint & Oil Company's Cement Paint

Cleveland Fare Boxes

have no bolts, nuts or screws, that can be removed from the outside. Let us tell you of other good features.

Let us explain.

The Cleveland Fare Box Co.
Cleveland, Ohio
Canadian Cleveland Fare Box Co., Ltd.
Preston, Ontario

STEEL AND STEEL PRODUCTS
MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY
General Sales Office: WIDENER BUILDING, PHILADELPHIA, PA.
DISTRICT SALES OFFICES:
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Consolidated Steel Corporation, 25 Broadway, New York, is the sole exporter of our commercial products.

ELECTRIC HEATER EQUIPMENTS

THERMOSTAT CONTROL EQUIPMENTS

Address All Communications to
BUSH TERMINAL
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Literature on Request

Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.
AMERICAN RATTAN & REED MFG. CO.
Brooklyn, N. Y.
AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

Perry Hartman Side Bearings and Center Plates

REDUCE YOUR POWER BILL AND MAKE YOUR CARS EASY RIDING

Flange wear is greatly reduced, rail wear decreased and derailments prevented. "Nosing" of trucks is stopped. No lubrication. Car maintenance reduced. 200,000 in use. Write for details.

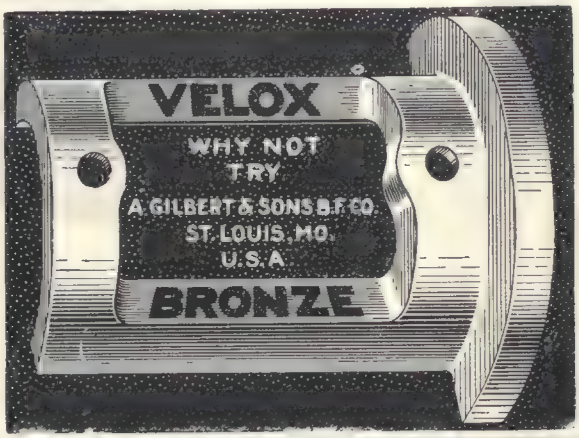
Burry Railway Supply Co., Peoples Gas Bldg., Chicago

Electric Railway Sales Distributors: Holden & White, Inc., Chicago—National Ry. Appliance Co., New York—Ry. & Power Engrg. Corp., Toronto, Can.

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.

The Differential Steel Car Co.
Findlay, Ohio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WHY NOT TRY
A. GILBERT & SONS B. F. CO.
ST. LOUIS, MO.
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BRONZE

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be mislead by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

"POSITIONS VACANT"

Good jobs appear under this heading in the

"SEARCHLIGHT SECTION"

EMPLOYERS! *Use* these columns for good men.

MEN! *Consult* these columns for good jobs.

8 cents a word. *Minimum $2.00 an insertion.*
0130

RAILWAY MOTOR BRUSHES

N C C
COLUMBIA
203

Grade 203, produced by research and proved by test, the most satisfactory and lowest cost-per-car-mile brush obtainable for A. C. commutator type railway motors. One of a series of standard railway motor brushes.

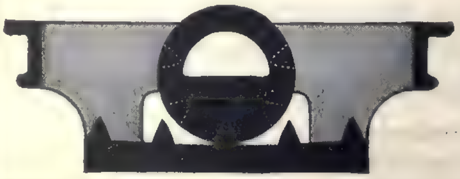
COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

Gets Every Fare
PEREY TURNSTILES or PASSIMETERS
Use them in your Prepayment Areas and Street Cars
Perey Manufacturing Co., Inc.
30 Church Street, New York City

ELECTRIC CAR HEATERS
THERMOSTATIC CONTROL
CONSOLIDATED CAR HEATING COMPANY
ELECTRO-PNEUMATIC
DOOR OPERATING DEVICES

55 New Users in the Last 4 Months

KASS SAFETY TREADS
present an Unusual Combination
in that they give BETTER RESULTS AT LESS COST
Manufactured and Sold by
Morton Manufacturing Company, Chicago



STUCKI SIDE BEARINGS
A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

SEARCHLIGHT SECTION

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word. minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

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Box Numbers in care of any of our offices count 5 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches	$4.50 an inch
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8 to 14 inches	4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

WANT armature winder to take charge of electrical repair shop vicinity New York. State experience, age, salary. P-471, Electric Railway Journal.

POSITIONS WANTED

SUPERINTENDENT with successful record as statistician and operating head, experienced in interurban, safety car and bus operation, can get desired results, satisfactory relations with present employer, personal reasons for desiring change. Address, PW-469, Electric Railway Journal, Leader-News Bldg., Cleveland, O.

MR. MANAGER—This is the age in which practical experience is of vital importance in the Electric Railway Industry. Are you in need of a capable, practical experienced superintendent of transportation who is capable of taking over details and handling same in a manner that would be a credit to your property? Successful in public relations and recognized as an economical operator. At present with a large property but desire a change on account of personal reasons. Very successful in handling labor and have made a study of safety work. A proven record of 18 years on city, suburban and interurban properties with high grade references from leading men in railway field is back of this ad. Would prefer a large city and suburban property that requires careful attention. PW-470, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

FOR SALE

NEW FIELD COILS

526 G. E. 1000, General Electric manufacture. $9.25 each F.O.B. Saybrook, Conn. *Immediate Shipment*

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York City.

"SEARCHLIGHT" IS Opportunity Advertising

—to help you get what you want.

—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want
"Think SEARCHLIGHT First"

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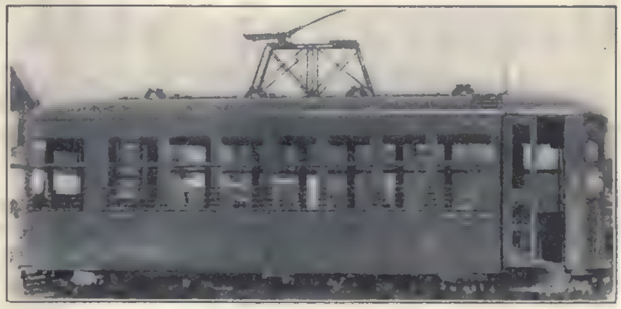

EIGHT BIRNEY ONE MAN CARS

WITH ALL SAFETY ATTACHMENTS

Built by Brill or Wasson Company; Cross Seats, Seating 32; Westinghouse Air Brakes; DH-16 Air Compressors; Electric Heaters.

These are in first class operating condition and will be painted and lettered to suit purchaser so that they will have the appearance of new cars when delivered.

Trucks and Motor Equipment

Brill 79-E Trucks 8 ft. wheel base 26 in. wheels.
2—WH-508 Motors.
2—Controllers for Double End Operation.

Code—"Clone"

TRANSIT EQUIPMENT CO., 501 Fifth Avenue, New York

FOR SALE

Complete Power Plant Equipment

Including Boilers, Pumps, Engines, W. H. Turbines, Rotary Converters, Frequency Changers and Transformers.

All in first-class condition. Plant closed on account of purchasing power.

For Further Information Address

The Cleveland, Painesville & Eastern R.R. Co.
Willoughby, Ohio

FOR SALE

RAILS

VIRTUALLY NEW

1,000 tons, 70 lbs.; 700 tons, 80 lbs. ASCE Section with Angles.

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York.

FOR SALE

2 SNOW SWEEPERS

On McGuire Truck, 50-hp. motors, double end K-35 G. E. Control. Very low price. Immediate delivery.

ELECTRIC EQUIPMENT COMPANY,
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

R. D. Nuttall Company's BP Grade

Gears and Pinions

New and Unused, as follows:

1—64-tooth, 5-in. bore, split spur.
4—66-tooth, 5⅜-in. bore, helical.
2—69-tooth, 3⅞-in. bore, spur.
7—71-tooth, 5-in. face, 3⅜-in. bore.
15—71-tooth, 5-in. face, 3⅞-in. bore.
16—71-tooth, 5-in. face, 4⅜-in. bore.

WEST PENN RAILWAYS CO.
P. O. 1223, Pittsburgh, Pa.

At the
Shipping Board's HOG ISLAND SALE
Beginning NOVEMBER FIRST

You'll find the goods you want at prices you'll be glad to pay—

NO matter how large your business is, or how small, the offerings in this auction sale will meet your needs.

Some of the items are in quantities large enough to supply the largest companies in America.

Other items are in smaller quantities.

All will be sold to the highest bidder, in lots to suit his needs, at the Shipping Board's Hog Island sale, beginning November 1.

This is a most unusual opportunity. Merchandise and equipment will be sold at prices which probably will not be offered again in our life's time. No company having use for any of the mechanical equipment offered for sale can afford to neglect this opportunity.

The United States Government wishes every business man to take advantage of this opportunity.

You don't have to handle your purchases for shipment from Hog Island. All materials in this auction will be loaded by the Government. After making your purchases, bidding on known quantities from representative samples grouped in a central warehouse, you can go home and "forget it," knowing that the goods you bought will be loaded without further trouble on your part.

The Government reserves the right to reject any or all bids.

The offerings on the opposite page, to which your attention is invited specifically, only point the way to the value for you in this auction. Write for detailed information.

Remember the date November 1st.

Remember the place – Hog Island, Phila., Pa.

What equipment from this list do you want for your plant?

ELECTRIC hoists, 1 ton capacity, of proved worth — twenty-three of them. One look will convince your purchasing agent that he did the right thing in attending this auction. If you need an electric hoist now, do not fail to get in your bid on one of these. And you cannot go wrong to buy one or more in anticipation of future needs.

PUMPS—quantities, and at right prices. A wide range of sizes and types. Also large stores of pump parts and spares. Just another reason you cannot afford to be absent when this auction begins on November 1.

SEARCHLIGHTS that you've been looking for. Made to deliver the goods wherever their light is demanded. New, in excellent condition, and of high power. The sizes range from eleven inches to eighteen inches.

HIGH speed drills and other small tools. There are approximately 40,000 drills, alone. They are stored in dry warehouses. Good election of sizes, and quantities to meet any demand.

LEBLONDE turret lathes are among the attractive offerings in machine tools. These lathes are heavy-duty, 25 x 10 ft. Other items in this field are hydraulic presses, threading machines, drill presses, pipe expanding machines and various special machines for the wood-working industry.

WELDING material is included in this auction. The offerings embrace both spot and arc welders, and equipment for same and should prove unusually attractive at the prices that will prevail.

ELECTRICAL material dealers and users will find much of interest in this auction. Attention is invited to the offerings of turbo-generator sets, motor generator sets, lubricating oil systems, blinker light controllers, telltale boards, motors, fans, etc.

FOR the shops where exact records of time on jobs are demanded, one of the electric recording instruments offered in this auction is just the thing. Several hundred will be sold, and the price is largely in your own hands.

GAUGES are of many types and sizes. Think of the kind or kinds you use or sell, and then remember you are more than likely to find your variety here. It will pay you to meet their familiar faces on November First.

AS for the rest, you will find rivet sets and countersinks, blacksmith tools, wrenches, taps and dies, ratchet drills, sleeves and sockets, reamers, chain and slings, plumbing supplies and fixtures, circular saws and belting.

In requesting your copy of the complete catalog of offerings, address:

U. S. Shipping Board Emergency Fleet Corp.
Hog Island, Philadelphia, Pa.
or
Samuel T. Freeman, Auctioneer, 1519 Chestnut St., Philadelphia, Pa.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

- **Advertising, Street Car**
  - Collier, Inc., Barron G.
- **Air Receivers & Aftercoolers**
  - Ingersoll-Rand Co.
- **Anchors, Guy**
  - Elec. Service Supplies Co.
  - Ohio Brass Co.
  - Western Electric Co.
  - Westinghouse E. & M. Co.
- **Armature Shop Tools**
  - Armature Coil Equip. Co.
  - Elec. Service Supplies Co.
- **Automatic Return Switch Stands**
  - Ramapo Ajax Corp.
- **Automatic Safety Switch Stands**
  - Ramapo Ajax Corp.
- **Axles**
  - Bemis Car Truck Co.
  - Cambria Steel Co.
  - Carnegie Steel Co.
  - Midvale Steel & Ord. Co.
- **Axle Straighteners**
  - Columbia M. W. & M. I. Co.
- **Axles, Car Wheel**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Westinghouse E. & M. Co.
- **Babbitt Metal**
  - More-Jones B. & M. Co.
- **Babbitting Devices**
  - Columbia M. W. & M. I. Co.
- **Badges and Buttons**
  - Elec. Service Sup. Co.
  - Int. Register Co., The
- **Batteries, Dry**
  - National Carbon Co.
- **Bearings and Bearing Metals**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Gilbert & Sons B. F. Co., A.
  - More-Jones Br. & Metal Co.
  - Westinghouse E. & M. Co.
- **Bearings, Center and Roller Side**
  - Burry Railway Supply Co.
  - Stucki Co., A.
- **Bearings, Roller**
  - Stafford Roller Bearing Car Truck Corp.
- **Bells and Gongs**
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Consolidated Car Heati'g Co.
  - Elec. Service Sup. Co.
  - Western Electric Co.
- **Boilers**
  - Babcock & Wilcox Co.
- **Boiler Tubes**
  - Cambria Steel Co.
  - Midvale Steel & Ord. Co.
- **Bond Testers**
  - Amer. Steel & Wire Co.
  - Elec. Service Sup. Co.
- **Bonding Apparatus**
  - Amer. Steel & Wire Co.
  - Electric Railway Improvement Co.
  - Elec. Service Sup. Co.
  - Indianapolis Switch & Frog Co.
  - Ohio Brass Co.
  - Railway Track-Work Co.
  - Rail Welding & Bonding Co.
  - Western Electric Co.
- **Bonds, Rail**
  - Amer. Steel & Wire Co.
  - Electric Railway Improvement Co.
  - Elec. Service Sup. Co.
  - General Electric Co.
  - Indianapolis Switch & Frog Co.
  - Ohio Brass Co.
  - Rail Welding & Bonding Co.
  - Western Electric Co.
  - Westinghouse E. & M. Co.
- **Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)**
  - American Bridge Co.
  - Bates Exp. Steel Tr. Co.
  - Electric Ry. Equipment Co.
  - Elec. Service Sup. Co.
  - Hubbard & Co.
  - Ohio Brass Co.
  - Western Electric Co.
- **Brake Adjusters**
  - Gould Coupler Co.
  - National Ry. Appliance Co.
  - Westinghouse Tr. Br. Co.
- **Brake Shoes**
  - Amer. Br. Shoe & Fdy. Co.
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
- **Brakes, Brake Systems and Brake Parts**
  - Allis-Chalmers Mfg. Co.
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
  - Columbia M. W. & M. I. Co.
  - Safety Car Devices Co.
  - General Electric Co.
  - National Brake Co.
  - St. Louis Car Co.
  - Westinghouse Tr. Br. Co.
- **Bridges and Buildings**
  - American Bridge Co.
- **Brooms, Brushes, Etc.**
  - Worcester Brush & Scraper Co.
- **Brooms, Track, Steel and Rattan**
  - Amer. Rattan & Reed Mfg. Co.
  - Worcester Brush & Scraper Co.
- **Brushes, Carbon**
  - General Electric Co.
  - Jeandron, W. J.
  - Le Carbone Co.
  - Morganite Brush Co., Inc.
  - National Carbon Co.
  - Westinghouse E. & M. Co.
- **Brushes, Graphite**
  - Morganite Brush Co., Inc.
  - National Carbon Co.
- **Brushes, Wire, Pneumatic**
  - Ingersoll-Rand Co.
- **Brush Holders**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
- **Bunkers, Coal**
  - American Bridge Co.
- **Buses, Motor**
  - Brill Co., The J. G.
  - Duplex Truck Corp.
  - Mitten-Traylor, Incorporated
- **Bushings**
  - Nat'l Fibre & Insulation Co.
- **Bushings, Case Hardened and Manganese**
  - Bemis Car Truck Co.
  - Brill Co., The J. G.
- **Bus Seats**
  - Hale & Kilburn Corp.
- **Cables, (See Wires and Cables)**
- **Cambric Tapes, yellow and black varnished**
  - Irvington Varnish & Ins. Co.
- **Carbon Brushes (See Brushes, Carbon)**
- **Car Panel Safety Switches**
  - Westinghouse E. & M. Co.
- **Cars**
  - Cambria Steel Co.
  - Midvale Steel & Ord. Co.
- **Cars, Dump**
  - Differential Steel Car Co.
- **Car Lighting Fixtures**
  - Elec. Service Sup. Co.
- **Car Panel Safety Switches**
  - Consolidated Car Heati'g Co.
- **Cars, Passinger, Freight, Express, etc.**
  - Amer. Car Co.
  - Brill Co., The J. G.
  - Kuhlman Car Co., G. C.
  - McGuire-Cummings Mfg. Co.
  - Midvale Steel & Ord. Co.
  - National Ry. Appliance Co.
  - Wason Mfg. Co.
- **Cars, Second Hand**
  - Electric Equipment Co.
  - Transit Equipment Co.
- **Cars, Self-Propelled**
  - General Electric Co.
- **Castings, Brass, Composition or Copper**
  - Anderson Mfg. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
  - More-Jones Br. & Metal Co.
- **Castings, Gray Iron and Steel**
  - American Bridge Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
- **Castings, Malleable and Brass**
  - Amer. Br. Shoe & Fdy. Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
- **Catchers and Retrievers, Trolley**
  - Earll, Chas. I.
  - Elec. Service Sup. Co.
  - Ohio Brass Co.
  - Wood Co., Chas. N.
- **Catenary Construction**
  - Archbold-Brady Co.
  - Western Electric Co.
- **Circuit-Breakers**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Clamps and Connectors for Wires and Cables**
  - Anderson Mfg. Co., A. & J. M.
  - Elec. Ry. Equipment Co.
  - Elec. Service Sup. Co.
  - General Electric Co.
  - Hubbard & Co.
  - Ohio Brass Co.
  - Westinghouse E. & M. Co.
- **Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)**
  - Brill Co., The J. G.
- **Clusters and Sockets**
  - General Electric Co.
- **Coal ad Ash Handling (See Conveying and Hoisting Machinery)**
- **Coasting Recorders**
  - Railway Improveent Co.
- **Coil Banding and Winding Machines**
  - Armature Coil Equip. Co.
  - Columbia M. W. & M. I. Co.
  - Elec. Service Sup. Co.
- **Coils, Armature and Field**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Coils, Choke and Kicking**
  - Elec. Service Sup. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Coin Counting Machines**
  - Intern'l Register Co.
  - Johnson Fare Box Co.
- **Commutator Slotters**
  - Elec. Service Sup. Co.
  - General Elec.tric Co.
  - Westinghouse E. & M. Co.
- **Commutator Truing Devices**
  - General Electric Co.
- **Commutatotrs or Parts**
  - Cameron Elec'l Mfg. Co.
  - Cleveland Armature Works
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Mica Insulator Co.
  - Westinghouse E. & M. Co
- **Compressors, Air**
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Western Electric Co.
  - Westinghouse Tr. Br. Co.
- **Compressors, Air Portable**
  - Ingersoll-Rand Co.
- **Concrete Products**
  - Massey Concrete Products Corp.
- **Concrete Reinforcing Bars**
  - Cambria Steel Co.
  - Midvale Steel & Ord. Co.
- **Condensers**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Condensor Papers**
  - Irvington Varnish & Ins. Co.
- **Connectors, Solderless**
  - Westinghouse E. & M. Co.
- **Connectors, Trailer Car**
  - Consolidated Car Heating Co.
  - Elec. Service Sup. Co.
  - Ohio Brass Co.
- **Controllers or Parts**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Controller Regulators**
  - Elec. Service Sup. Co.
- **Controlling Systems**
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Converters, Rotary**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Westinghouse E. & M. Co.
- **Conveying and Hoisting Machinery**
  - American Bridge Co.
  - Columbia M. W. & M. I. Co.
- **Copper Wire**
  - Anaconda Copper Mining Co.
- **Cord Adjusters**
  - Nat'l Fibre & Insulation Co. etc.
- **Cord, Bell, Trolley, Register,**
  - Brill Co., The J. G.
  - Elec. Service Sup. Co.
  - Internat'l Register Co., The
  - Roebling's Sons Co., John A.
  - Samson Cordage Works
  - Silvevr Lake Co.
- **Cord Connectors and Couplers**
  - Elec. Service Sup. Co.
  - Samson Cordage Works
  - Wood Co., Chas. N.
- **Couplers, Car**
  - Brill Co., The J. G.
  - Gould Coupler Co.
  - Ohio Brass Co.
  - Westinghouse Tr. Br. Co.
- **Cranes**
  - Allis-Chalmers Mfg. Co.
- **Cross Arms (See Brackets)**
- **Crossing Foundations**
  - Internatiional Steel Tie Co.
- **Crossings**
  - Ramapo Ajax Corp.
- **Crossing Signals (See Signals, Crossing)**
- **Crossing, Frog & Switch**
  - Wharton, Jr., & Co., Wm.
  - Ramapo Ajax Corp.
- **Crossing Manganese**
  - Indianapolis Switch & Frog Co.
  - Ramapo Ajax Corp.
- **Crossings, Track (See Track, Special Work)**
- **Crossings, Trolley**
  - Ohio Brass Co.
- **Culverts**
  - Canton Culvert & Silo Co.
- **Culverts, Pipe Concrete**
  - Massey Concrete Products Corp.
- **Curtains and Curtain Fixtures**
  - Brill Co., The J. G.
  - Elec. Service Sup. Co.
  - Moton Mfg. Co.
- **Dealer's Machinery**
  - Elec. Equipment Co.
  - Foster Co., H. M.
- **Derailing Devices (See also Track Work)**
  - Wharton, Jr., & Co., Wm.
- **Derailing Swiches, Tee Rail**
  - Ramapo Ajax Corp.
- **Detective Service**
  - Wish-Service, P. Edward
- **Dogs, Lathe**
  - Williams & Co., J. H.
- **Door Operating Devices**
  - Brill Co., The J. G.
  - Consolidated Car Heati'g Co.
  - General Electric Co.
  - Nat'l Pneumatic Co., Inc.
- **Doors, Folding Vestibule**
  - Nat'l Pneumatic Co., Inc.
- **Drills, Rock**
  - Ingersoll-Rand Co.
- **Drills, Track**
  - Amer. Steel & Wire Co.
  - Elec. Service Sup. Co.
  - Ingersoll-Rand Co.
  - Ohio Brass Co.
- **Dryers, Sand**
  - Elec. Service Sup. Co.
- **Ears**
  - Ohio Brass Co.
- **Electrical Wires and Cables**
  - Amer. Electrical Works
  - Roebling's Sons & Co., J. A.
  - Western Electric Co.
- **Electric Grinders**
  - Railway Track-Work Co.
- **Electrodes, Carbon**
  - Indianapolis Switch & Frog Co.
  - Railway Track-Work Co.
- **Electrodes, Steel**
  - Indianapolis Switch & Frog Co.
  - Railway Track-Work Co.
- **Engineers, Consulting, Contracting and Operating**
  - Allison & Co., J. S.
  - Archbold-Brady Co.
  - Arnold Co., The
  - Beeler, John A.
  - Byllesby & Co., H. M.
  - Day & Zimmerman, Inc.
  - Dodd, J. N.
  - Drum & Co., A. L.
  - Feustell, Robert M.
  - Ford, Bacon & Daviis
  - Gould, L. E.
  - Hemphill & Wells
  - Holst, Engelhardt W.
  - Jackson, Walter
  - Kelly, Cooke & Co.
  - Richey, Albert S.
  - Robinson & Co., Dwight P.
  - Sanderson & Porter
  - Sangster & Mathews
  - Smith & Co., C. E.
  - Stone & Webster
  - White Eng. Corp., The J. G.
  - Witt, Peter
- **Engines, Gas, Oil or Steam**
  - Allis-Chalmers Mfg. Co.
  - Ingersoll-Rand Co.
  - Westinghouse E. & M. Co.
- **Fare Boxes**
  - Cleveland Fare Box Co.
  - Johnson Fare Box Co.
  - Economy Elec. Devices Co.
  - Nat'l Ry. Appliance Co.
- **Fence**
  - Cambria Steel Co.
  - Midvale Steel & Ord. Co.
- **Fences, Woven Wire and Fence Posts**
  - Amer. Steel & Wire Co.
- **Fenders and Wheel Guards**
  - Brill Co., The J. G.
  - Cleveland Fare Box Co.
  - Consolidated Car Fender Co.
  - Elec. Service Sup. Co.
  - Star Brass Works
- **Fibre and Fibre Tubing**
  - Nat'l Fibre & Insulation Co.
  - Westinghouse E. & M. Co.
- **Field Coils (See Coils)**
- **Flaxlinum Insulation**
  - Nat'l Ry. Appliance Co.
- **Floodlights**
  - Elec. Service Sup. Co.
- **Flooring Composition**
  - Amer. Mason Safety Tread Co.
- **Floor Plates**
  - Amer. Abrasive Metals Co.
- **Forgings**
  - Cambria Steel Co.
  - Carnegie Steel Co.
  - Columbia M. W. & M. I. Co.
  - Midvale Steel & Ord. Co.
  - Williams & Co, J. H.
- **Frogs & Crossings, Tee Rail**
  - Ramapo Ajax Corp.
- **Frogs, Track (See Track Work)**
- **Frogs, Trolley**
  - Ohio Brass Co.
- **Funnel Castings**
  - Wharton, Jr., Inc., & Co., Wm.
- **Fuses and Fuse Boxes**
  - Columbia M. W. & M. I. Co.
  - Consolidated Car Heati'g Co.
  - General Electric Co.
  - Western Electric Co.
  - Westinghouse E. & M. Co.
  - Williams & Co., J. H.
- **Fuses, Refillable**
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
- **Gaskets**
  - Westinghouse Tr. Br. Co.
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  - Economy Elec. Devices Co.
- **Gas-Electric Cars**
  - General Electric Co.
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  - Westinghouse E. & M. Co.
- **Gates, Car**
  - Brill Co., The J. G.
- **Gear Blanks**
  - Cambria Steel Co.
  - Carnegie Steel Co.
  - Midvale Steel & Ord, Co.
- **Gear Cases**
  - Chillingworth Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - Elec. Service Sup. Co.
  - Westinghouse E. & M. Co.
- **Gears and Pinions**
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Elec. Service Sup. Co.
  - General Electric Co.
  - Nat'l Ry. Appliance Co.
  - Nuttall Co., R. D.
  - Tool Steel Gear & Pinion Co.
- **Generating Sets, Gas-Electric**
  - General Electric Co.
- **Generators**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co.
  - Western Electric Co.
  - Westinghouse E. & M. Co.
- **Goggles—Eye**
  - Indianapolis Switch & Frog Co.
- **Gong (See Bells and Gongs)**
- **Greases (See Lubricants)**
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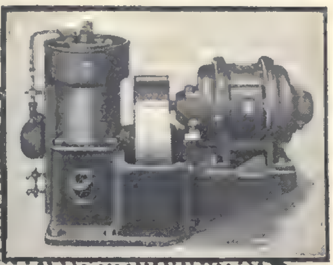
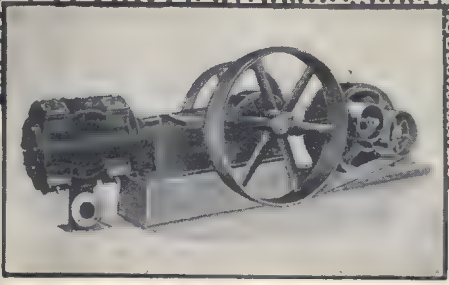
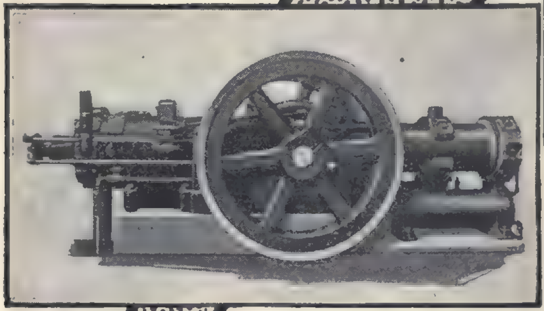
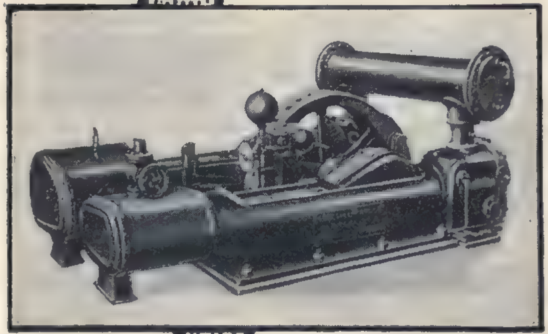
  - Metal & Thermit Corp.
  - Indianapolis Switch & Frog Co.
  - Railway Track-work Co.
- **Grinders, Portable**
  - Railway Track-Work Co.
- **Grinders, Portable Electric**
  - Railway Track-Work Co.
- **Grinding Blocks and Wheels**
  - Railway Track-work Co.
- **Guard Rail Clamps**
  - Ramapo Ajax Corp.
- **Guard Rails, Tee Rail & Manganese**
  - Ramapo Ajax Corp.
- **Guards, Cattle**
  - American Bridge Co.
- **Guards, Trolley**
  - Elec. Service Sup. Co.
  - Ohio Brass Co.
- **Hammers Pneumatic**
  - Ingersoll-Rand Co.
- **Harps, Trolley**
  - Anderson Mfg. Co., A. & J. M.
  - Bayonet Trolley Harp Co
  - Elec. Service Sup. Co.
  - More-Jones Br. & Metal Co
  - Nuttall Co., R. D.
  - Star Brass Works
  - Western Electric Co.
- **Headlights**
  - Elec. Service Sup. Co
  - General Electric Co.
  - Ohio Brass Co.
- **Heaters, Car (Electric)**
  - Consolidated Car Heati'g Co.
  - Economy Elec. Devices Co.
  - Gold Car Heat. & Light. Co
  - Nat'l Ry. Appliance Co.
  - Smith Heater Co., Peter

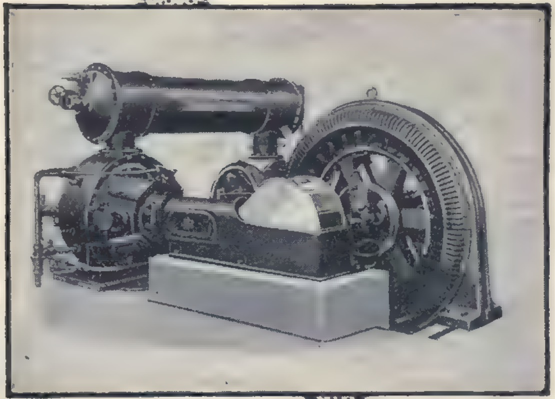
IR AIR COMPRESSORS











R-430

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NO matter what capacity, pressure or type of drive, one of the thousand and more types and sizes of Ingersoll-Rand Air Compressors will just fit your requirements.

There are standard compressors for pressures up to 3500 pounds per square inch, and for capacities ranging from 3 to 50,000 cubic feet of free air per minute.

The question of drive has been given the most careful consideration. Whether direct-connected electric motor drive, oil or gas engine, belt or steam drive is preferred you can purchase the *complete* compressor unit from the Ingersoll-Rand Company, with the assurance that every detail of compressor and prime-mover has been given correct attention.

In addition to air compressors the Ingersoll-Rand Company manufacture a complete line of gas and ammonia compressors. Our engineers are located in all parts of the world. These men are experts on the subject of ari and gas compression and will be glad to discuss your problem with you. Also, these compressors are described in illustrated booklets, copies of which will be sent you on request.

INGERSOLL-RAND COMPANY
11 Broadway, New York

Offices in all principal domestic
and foreign cities

671-C

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Smith Heater Co., Peter
Hoists and Lifts
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Ford Chain Block Co.
Hoists, Portable
Ingersoll Rand Co.
Houses, Station & Watchmen's Concrete
Massey Concrete Products Corp.
Hydraulic Machinery
Allis-Chalmers Mfg. Co.
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Elec. Service Sup. Co.
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Western Electric Co.
Westinghouse E. & M. Co.
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General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
National Fibre & Insulation
Standard Underground Cable Co.
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Sterling Varnish Co.
Insulating Silk
Irvington Varnish & Ins. Co.
Insulating Varnishes
Irvington Varnish & Ins. Co.
Sterling Varnish Co., The
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Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Sterling Varnish Co., The
Westinghouse E. & M. Co.
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Electric Service Sup. Co.
General Electric Co.
Hemingray Glass Co
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.
Insulator Pins
Elec. Service Sup. Co.
Hubbard & Co.
Insurance, Fire
Marsh & McLennan
Jacks (See also Cranes, Hoists and Lifts).
Buckeye Jack Mfg. Co.
Elec. Service Sup. Co.
Joints Rail
(See Rail Joints)
Journal Boxes
Bemis Car Truck Co.
Brill Co. J. G.
Junction Boxes
Std. Underground Cable Co.
Labor Adjusters
Corpn. Service Bureau, The
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Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Lamps, Arc and Incandescent (See also Headlights).
Anderson, M. Co., A. & J. M.
General Electric Co.
Westinghouse E. & M. Co.
Lanterns, Classification
Nichols-Lintern Co.
Lamps, Signal and Marker
Nichols-Lintern Co.
Lathe Attachments
Williams & Co., J. H.
Lightning Protection
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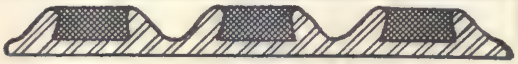

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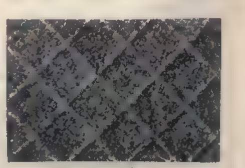

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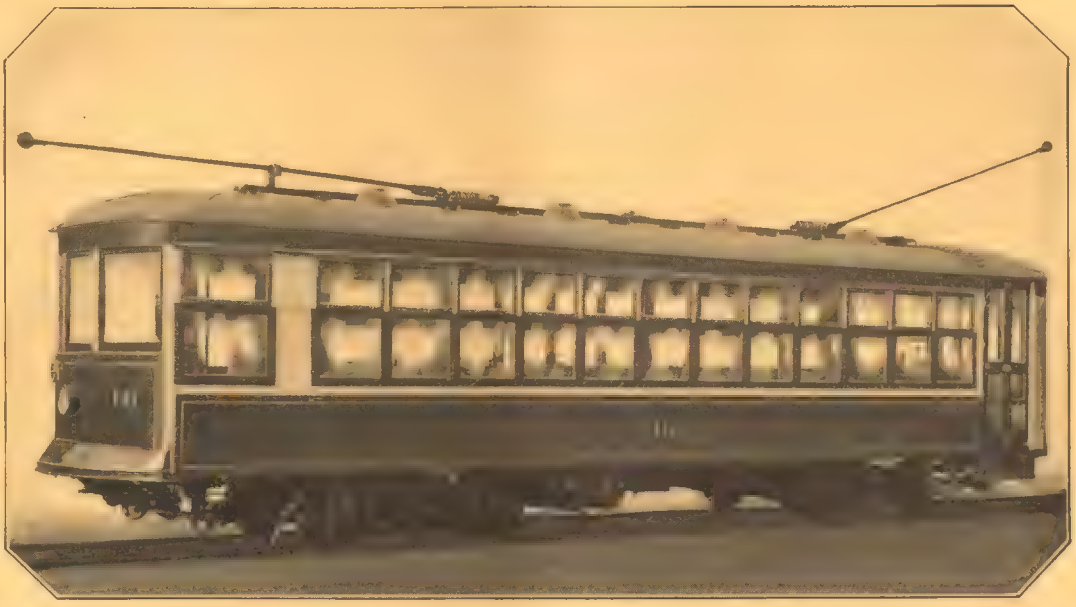

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MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

CANDLER BUILDING, THE HOME OF COLLIER SERVICE

Barron G. Collier
INCORPORATED
Candler Bldg., New York

Monthly Mechanical and Engineering Edition

ELECTRIC RAILWAY JOURNAL

McGraw-Hill Company, Inc. Twenty Cents Per Copy

October 28, 1922

And Now!

—the real meaning of pure copper trolley wheels

(No alloy)

NEGLECT THE WHEEL AND RISK THE WIRE

For each trolley wheel there is from 500 to 2000 pounds of trolley wire in use. Investment? One hundred to five hundred dollars in wire to one dollar in wheels.

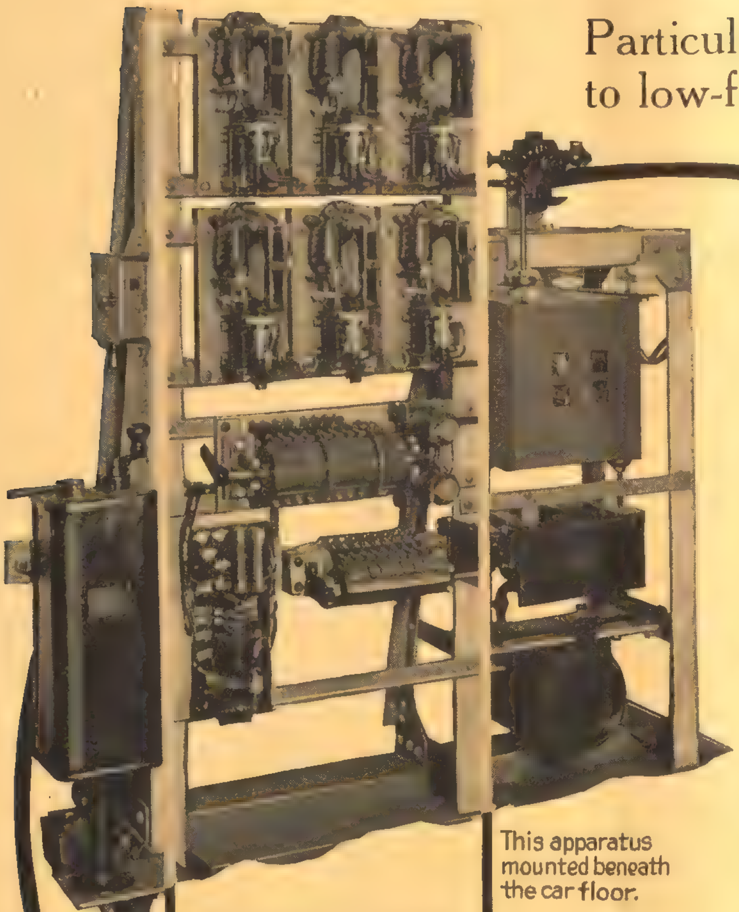
Are you jeopardizing this wire investment? Or is it protected by "Cleveland" All Copper trolley wheels—copper for toughness—die-forging producing balance and smooth running.

*"They're forged—not cast—
that's why they last"*

THE COPPER PRODUCTS FORGING COMPANY
CLEVELAND, OHIO

Cabinet Control

Particularly adapted for application to low-floor cars.



This apparatus mounted beneath the car floor.

This apparatus in cabinet inside of car on platform, or under seats, or beneath the car floor.

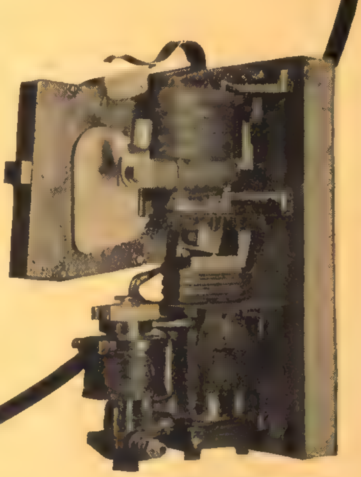
Control Switch and Master Controller on platform.

WESTINGHOUSE ELECTRIC

The necessity for train-operation, and the increased use of low-floor cars, have created a demand for a light-weight, multiple-unit control which is rugged an easily accessible.

HL Cabinet Control fulfills these requirements and also provides the necessary flexibility of arrangement of control elements to meet all conditions.

It can be mounted in one or more cabinets located either above or below the car floor. The control elements are all of the unit type, permitting overhauling to be done on the bench rather than on the car. The use of HL Cabinet Control minimizes the time that the cars are out of service for electrical repairs.



Switch Unit

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

Westinghouse

Vol. 60, *No.* 18 New York, October 28, 1922 *Pages* 695-732

ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE, Editor

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879. Printed in U. S. A.

The Growth of Industry

BEHIND the work of the world's millions is the fabric of the world's industrial equipment. Into this fabric is woven the design of modern life.

Vast, powerful and interdependent is this living industrial age. In little more than half a century science has transformed our globe of land and water into one gigantic institution.

This colossal ball whirling through space, which geographers once separated into hemispheres, and which governments and languages divided into nations, industry has united through service to meet human needs.

Where the discoverer once carried a flag and for the first time left an imprint of the foot of man, industry now delivers its wares for the preservation, comfort and refinement of life.

Commerce knows no nationality and industry speaks all languages. Where man is, there is a market.

While population has multiplied, sending overflowing peoples to cover trackless reaches of wilderness, the genius of the engineer has developed transportation, communication and production, so that all men may claim the right to live and progress.

From the day of the isolated craftsman to this day of massed industry, the engineer has made possible an advance which cannot be reckoned because there has been no similar advance comparable with it.

Of all the divisions of human effort there is none which may challenge the supremacy of the engineer, or show growth of like importance to human life.

In the development of physical property, in capital investment, in labor employment, in scientific improvement of working conditions and equipment, in the advancement of product, in the accuracy of executive control, and in the service of the whole world of consumption, throughout the course of man's activities there has been manifest the trained mind of the engineer.

The growth of industry is proof of the service of the engineer.

MCGRAW-HILL COMPANY, INC.

[The statement printed above is the third advertisement of the McGraw-Hill Company, picturing the influence of the engineer in the affairs of the world. This advertisement was published in the issue of the *New York Times* for Oct. 16.]

Circulation of this issue, 5,700 **Advertising Index—Alphabetical, 44; Classified, 40-42; Searchlight Section, 38**

RAILWAY maintenance men everywhere are learning the virtues of WABCO.

WABCO

WABCO is the new Brake Cylinder Packing Cup which in two years has upset every precedent for packing cup efficiency and economy.

WABCO simply doesn't wear out under ordinary conditions. It stands up with a firm, resilient body, remains always airtight, is not injured by oil or water, nor affected by any cylinder temperature found in actual operation.

We developed WABCO to give the railway industry a better packing cup *material* and a better packing cup *design* than it had ever known before.

We wanted a packing that would eliminate brake cylinder leakage—and something that would give *indefinite wear*.

WABCO does both!

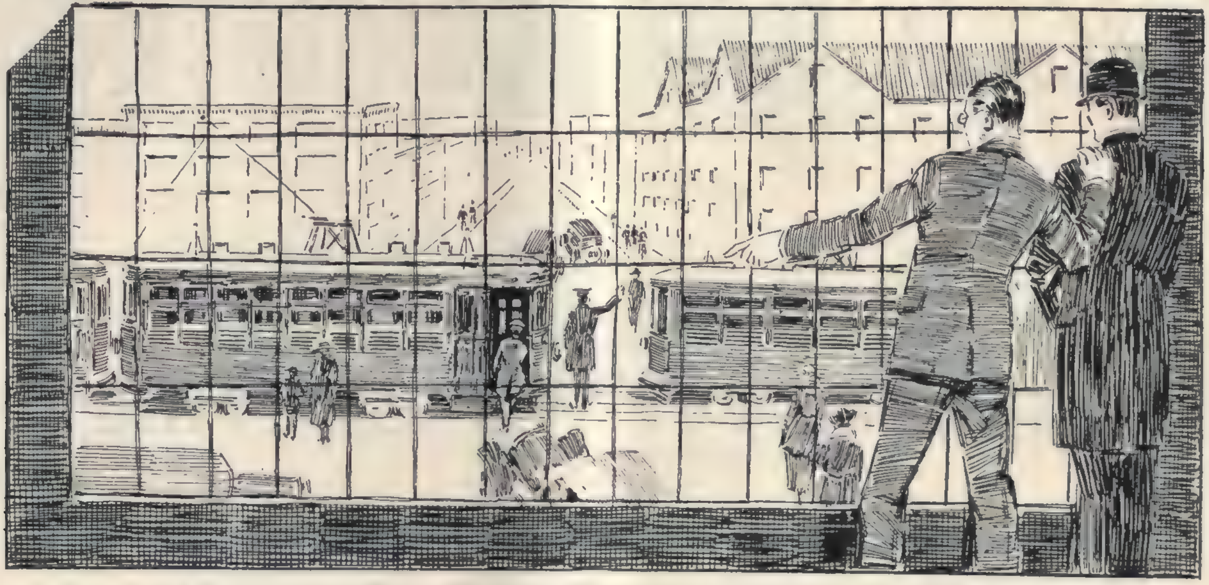
Westinghouse Traction Brake Company
General Offices and Works: Wilmerding, Pa.

OFFICES:

Boston, Mass.
Chicago, Ill.
Columbus, O.
Denver, Colo.
Houston, Tex.
Los Angeles
Mexico City
St. Louis, Mo.
St. Paul, Minn.
New York
Pittsburgh
Washington
Seattle
San Francisco

TRADE MARK

WESTINGHOUSE TRACTION BRAKES



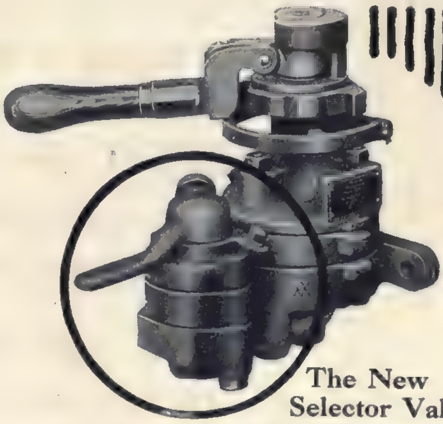
"Solves the Door Control Problem"

IN operating double-passageway Safety Cars, why throw *both* doors open at *every stop?*

The new Selector Valve obsoletes this practice and adds greatly to the advantages of double-door operation by providing a quick, easy means of independent door control for entrance only, exit only, or both at once, as occasion requires.

Independent door control is a valuable aid to the motorman in regulating the flow of passengers in such manner as he deems best suited to the conditions of one-man operation.

And in cold weather especially, a material saving in heat, as well as better protection for passengers, will result from a system which makes it unnecessary to open both doors at every stop.



The New Selector Valve

The above illustration shows the new Selector Valve (outlined in the black circle) as incorporated in the pipe bracket of the standard M-28 Safety Car Brake Valve.

We furnish the Air Brake and Safety Car Control Equipment which *makes* the Safety Car

SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

Insurance plus
Marsh & McLennan Service

A Worth While Saving

The Service of Marsh & McLennan Engineers results in a direct dollars and cents saving in insurance cost.

A large eastern corporation, for example, was able to reduce its insurance cost from $17.50 per thousand to $4.30 per thousand, by carrying out the recommendations of our engineering service.

We will be glad to outline this service to business executives who are interested in reducing insurance costs.

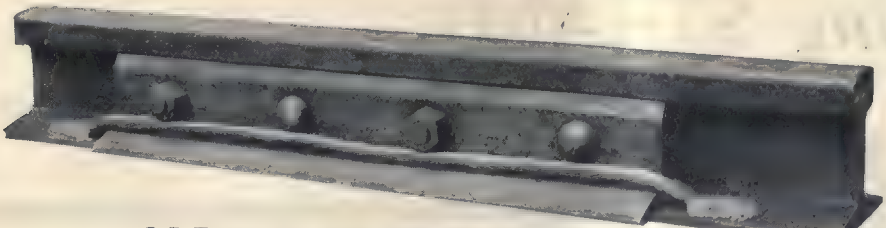
MARSH & McLENNAN
175 W. Jackson Blvd. Chicago, Ill.

Minneapolis
New York
Detroit

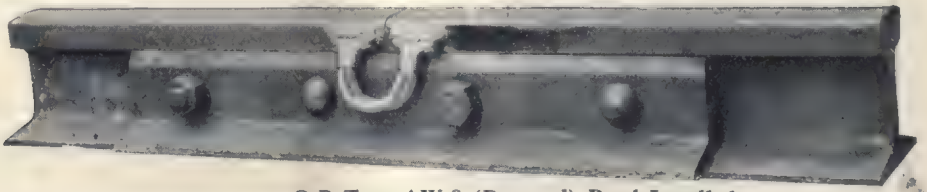
Denver
Duluth
Columbus

San Francisco
Seattle
Cleveland

Winnipeg
Montreal
London



O-B Type AW-7 Bond (Patented) Installed
It is easy to weld on all sides of the rounded terminal.



O-B Type AW-8 (Patented) Bond Installed
Notice the full area weld.

O-B AW-7 and AW-8 Rail Bonds encourage good work

A rail bond can't do you any good until it is installed—properly—on the rails. How well it is installed depends on the man who does the work and the design of the bond.

O-B AW-7 and AW-8 Bonds—the latest development in electric arc weld bonding—shoulder the major share of responsibility for correct application.

A heavy steel terminal protects the copper of the bond during installation from excessive heat and molten metal. The weld is made from "steel to steel with steel"—the easiest electric weld. The weld is made in a wide angle—better than the minimum of ninety degrees.

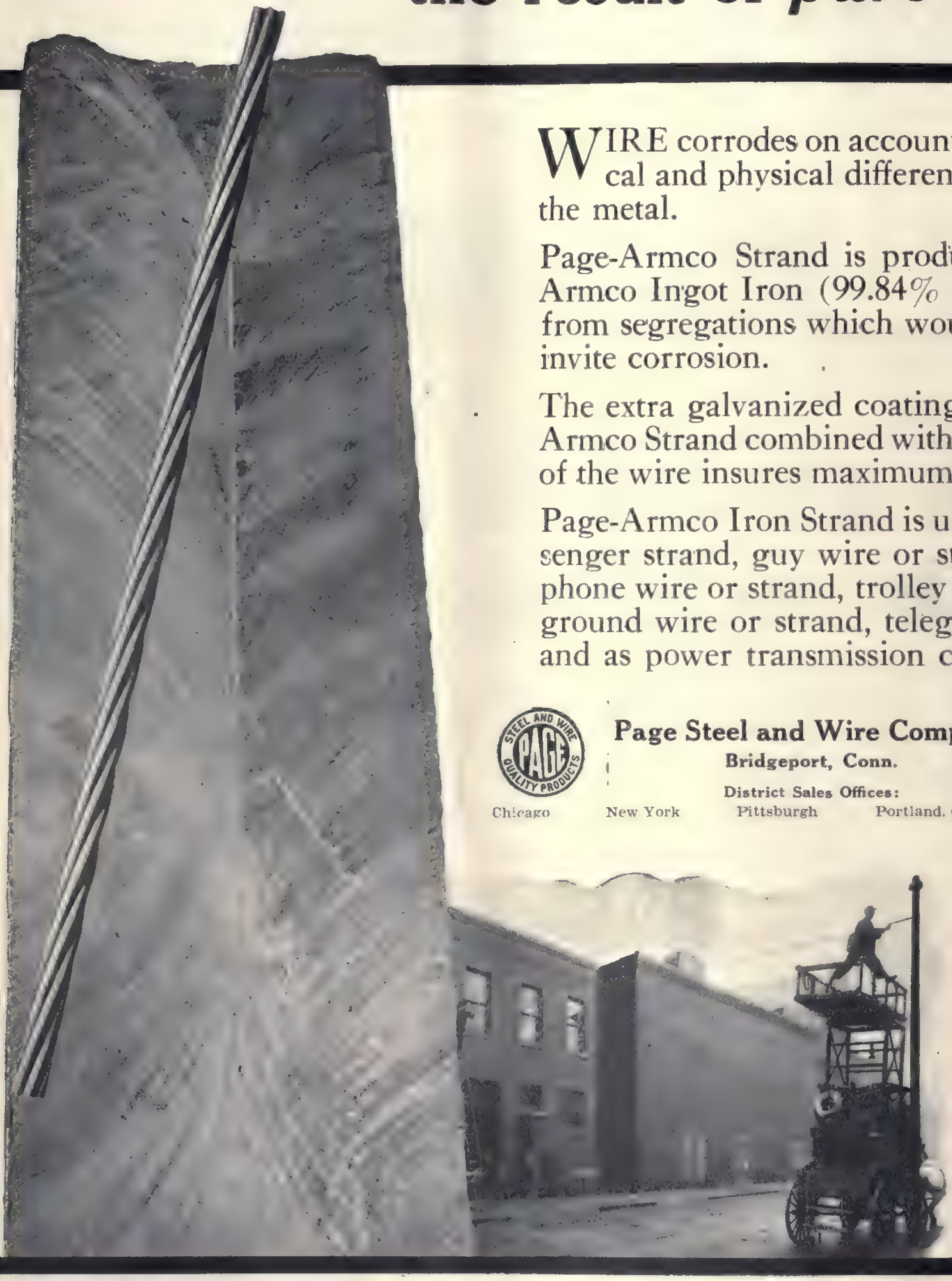
After they are installed O-B AW-7 and AW-8 Bonds are sure to endure. The steel terminal reinforces the weld. A copper sleeve surrounds the copper strand, at the terminal, and protects it from vibration.

O-B AW-7 and AW-8 Bonds are good bonds that stay good. *May we tell you more about them?*

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

rust-resisting STRAND
the result of *pure metal*



WIRE corrodes on account of chemical and physical differences within the metal.

Page-Armco Strand is produced from Armco Ingot Iron (99.84% pure) free from segregations which would tend to invite corrosion.

The extra galvanized coating on Page-Armco Strand combined with the purety of the wire insures maximum service.

Page-Armco Iron Strand is used as messenger strand, guy wire or strand, telephone wire or strand, trolley span wire, ground wire or strand, telegraph wire, and as power transmission conductors.

Page Steel and Wire Company
Bridgeport, Conn.
District Sales Offices:
Chicago New York Pittsburgh Portland, Ore. San Francisco

MANUFACTURERS OF

Rods—Armco Ingot Iron and Special Analysis Steels.

Wire—Plain and Galvanized — Spring, Rope, Telephone, Telegraph, Bond, Strand, Oxyacetylene and Electric Welding Wire.

Fence—Woven Wire for Farm and Railway Right of Way, Wire Link Protection for Industrial Plants, Lawns, Schools and Estates, and Factory Partitions.

PAGE-ARMCO INGOT IRON
GALVANIZED STRAND

—Saving noted by use of Steel Ties

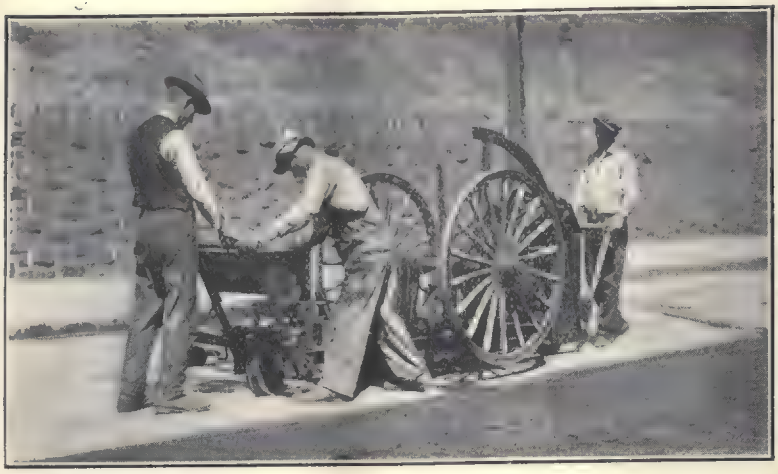
See the complete editorial, page 536 Electric Railway Journal, Oct. 7, 1922.

"The matter of additional investment required in substitute ties is not pertinent, for this is more than offset by the saving in concrete possible thereby on account of the greater bearing area, wider permissible spacing and shallower depth of the steel ties."

Plan now to use Twin Ties in 1923.

International Steel Tie Co.
Cleveland

Steel Twin Tie Track



RECIPROCATING TRACK GRINDERS

Save More Than Just the Rail Surface

RAIL which is corrugated and rough, is not only more quickly worn out itself, but the shocks of heavy wheels passing over every irregularity, are transmitted to the whole track structure and to the car body. The life of track and cars is thereby shortened.

The Reciprocating Track Grinder provides the quickest and most economical means of smoothing out corrugated rail. It uses a long, straight grinding block which shapes itself to fit the railhead, thus not only smoothes it, but also restores it to its original contour.

Track Maintenance Equipment

UNIVERSAL ROTARY TRACK GRINDERS

ATLAS RAIL GRINDERS **AJAX ARC WELDERS**

Send your inquiry now for track welding and grinding equipment

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

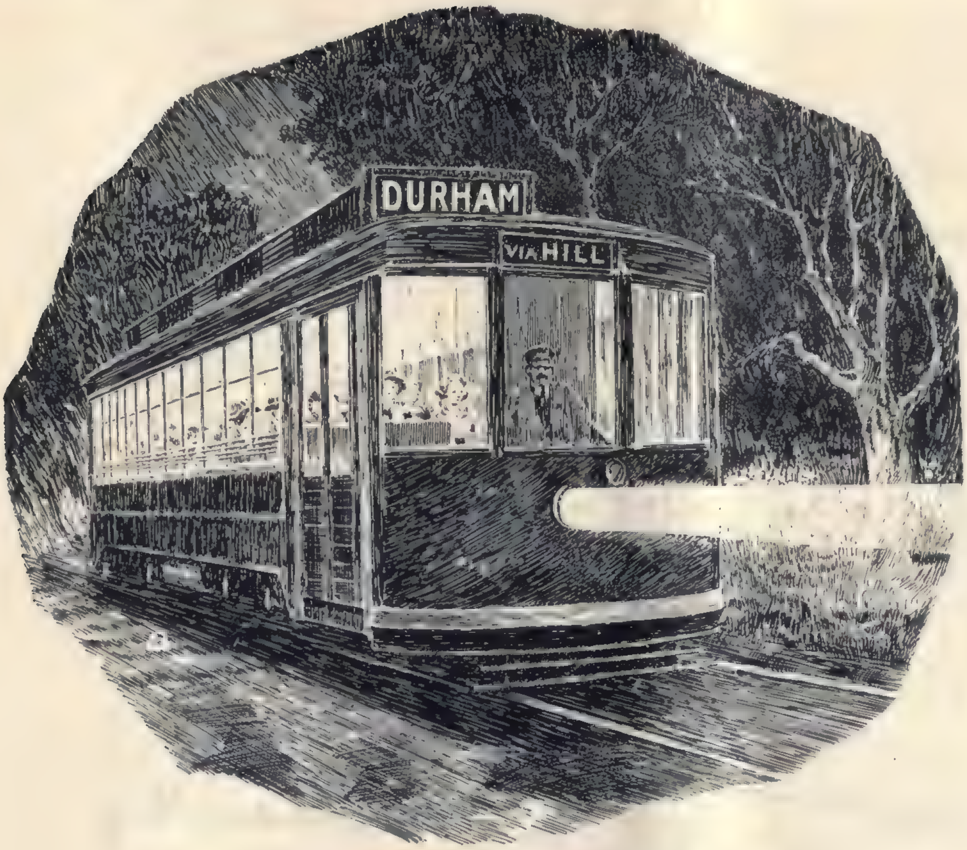
AGENTS:

Chas. N. Wood Co.
Boston

Electrical Engineering & Mfg. Co.
Pittsburgh

Atlas Railway Supply Co.
Chicago

P. W. Wood
New Orleans



Riding in the Night

25 per cent do it

There would be more night riders if you could sell them on better service. By eliminating uncertainty, identifying cars and their routes, you secure the night riders' good will. They will ride more often on cars that unmistakably advertise their routes and destination points—that look as illuminated from the outside as they do inside.

Golden Glow Headlights identify your cars in general and make it easier for the motormen and opposing traffic.

Keystone-Hunter Illuminated signs easily identify your cars in particular at a distance convenient to the night rider.

Write for data sheets.

Keystone-Hunter Illuminated Signs (They're white by day).

Golden Glow Headlights for either portable or permanent installation on the dash.

Electric Service Supplies Co.

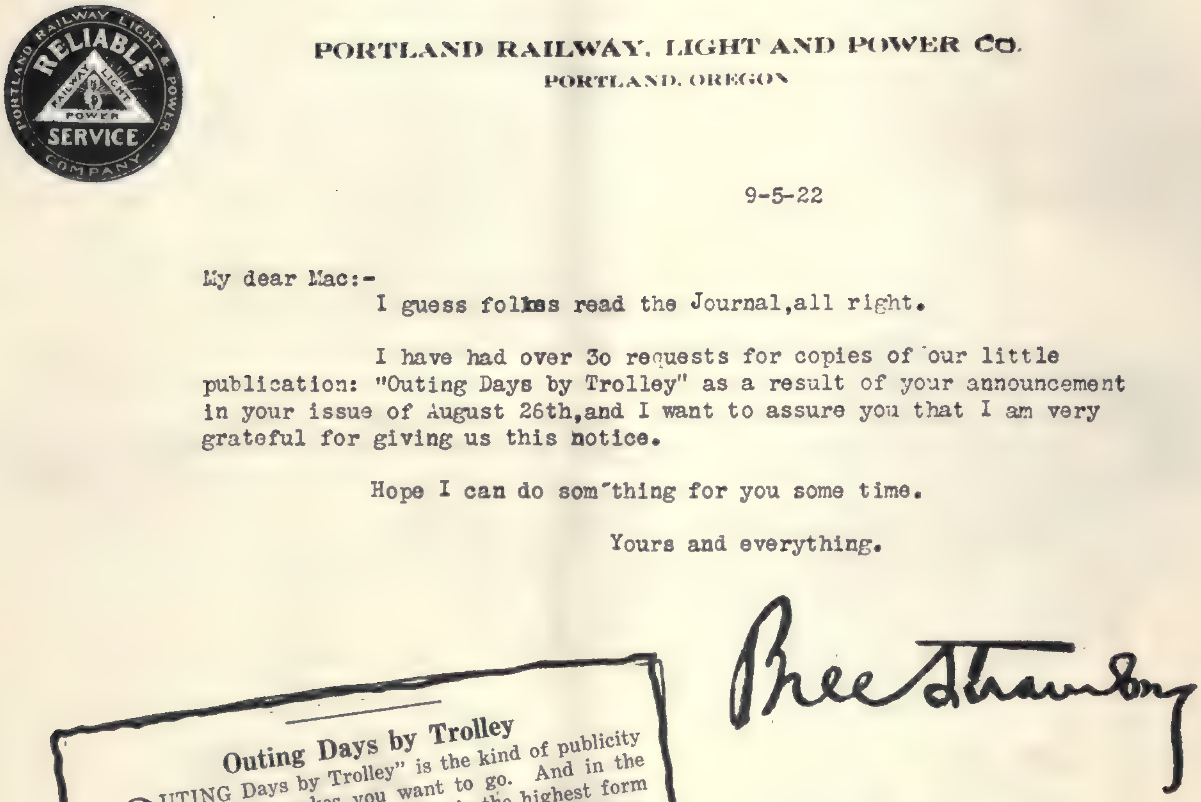
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

***Branch Offices:* Boston, Scranton, Pittsburgh**
***Canadian Distributors:* Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver**



PORTLAND RAILWAY, LIGHT AND POWER Co.
PORTLAND, OREGON

9-5-22

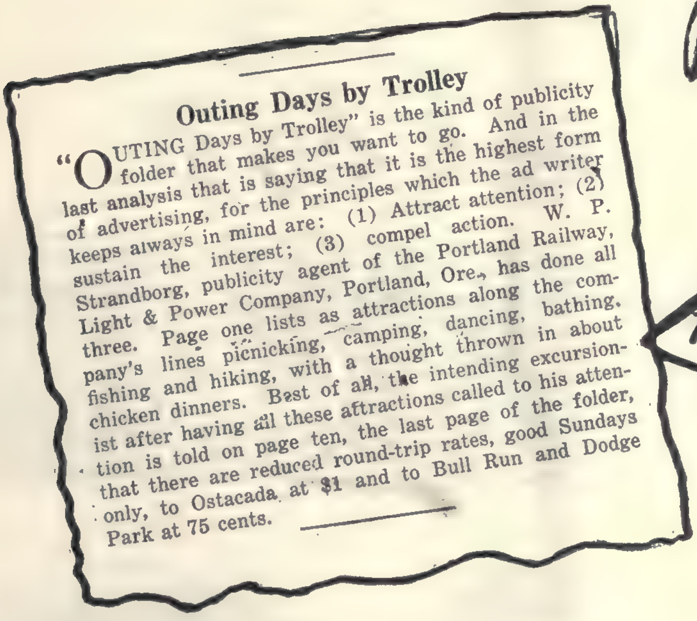
My dear Mac:-
I guess folks read the Journal,all right.

I have had over 3o requests for copies of our little publication: "Outing Days by Trolley" as a result of your announcement in your issue of August 26th,and I want to assure you that I am very grateful for giving us this notice.

Hope I can do som"thing for you some time.

Yours and everything.

Bill Strandborg



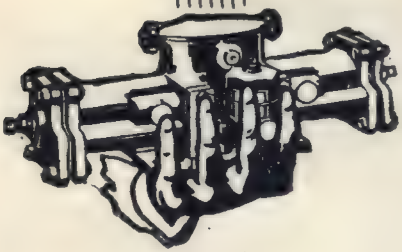
Outing Days by Trolley

"OUTING Days by Trolley" is the kind of publicity folder that makes you want to go. And in the last analysis that is saying that it is the highest form of advertising, for the principles which the ad writer keeps always in mind are: (1) Attract attention; (2) sustain the interest; (3) compel action. W. P. Strandborg, publicity agent of the Portland Railway, Light & Power Company, Portland, Ore., has done all three. Page one lists as attractions along the company's lines picnicking, camping, dancing, bathing, fishing and hiking, with a thought thrown in about chicken dinners. Best of all, the intending excursionist after having all these attractions called to his attention is told on page ten, the last page of the folder, that there are reduced round-trip rates, good Sundays only, to Ostacada at $1 and to Bull Run and Dodge Park at 75 cents.

This was the item

They certainly do read it—
text and ads—

Electric Railway Journal



On Again! Off Again!

You know the kind of passenger that jumps on just as the car is starting, finds out it's the wrong car and leaps headlong for the granite paving again. Who stands the damages is the next question?

Modern interlocking pneumatic equipment stops that kind of business. Passengers can't jump on *when* door is closed! Car can't start *until* door is closed! Passengers can't jump off again *after* door is closed! That's why National Pneumatic door and step devices end the "boarding and alighting" variety of accidents.

NATIONAL PNEUMATIC

Door and Step Control
Door and Step Operating Mechanism
Motorman's Signal Lights
Safety Interlocking Door Control
Multiple Unit Door Control

National Pneumatic Company, Inc.

50 Church St., New York
McCormick Bldg., Chicago
Works: Rahway, N. J.

Manufactured in Canada by Dominion Wheel & Foundries, Ltd.
Toronto, Canada.

J-P.Co. NOARK FUSE REG. IN U.S. PAT. OFF.

PROTECTION NOARK SERVICE JP VULCABESTON

Some of you urged us to put out a line of NON-INDICATING Noark fuses

And we realize that those of you who want *non-indicating* fuses are entitled to have non-indicating fuses that can be relied on to exhibit in service the same dependable characteristics that have made the NOARK label a certificate of superior fuse quality everywhere recognized by electrical men. You may be absolutely confident that in every detail of their design and construction the NOARK standard of quality has been and will be steadfastly maintained in the new NOARK non-indicating fuses.

The same NOARK quality—through and through

THE JOHNS-PRATT COMPANY, Hartford, Conn.

New York
41 East 42nd Street

Boston (9)
161 Summer Street

Chicago
35 S. Desplaines Street

San Francisco
Call Building

St. Louis
Boatmen's Bank Bldg.

Philadelphia
Franklin Trust Bldg.

Pittsburgh
Bessemer Bldg.

Johns-Pratt

NOARK FUSES AND PROTECTIVE DEVICES   VULCABESTON PACKING AND INSULATION   JOHNS-PRATT MOLDED PRODUCTS

1920-3

Lubrication is of Extreme Importance

EXECUTIVE officers of electric railways are awakening to the fact that lubrication is not only a determining factor in securing efficient service from power house and rolling equipment, but that many other important expense items are regulated largely by its quality.

The installation of efficient lubrication on your road is not the simple proposition of buying oil, nor does the purchase of cheap oil indicate economy in lubrication—in fact, quite the reverse.

Service is the one unfailing test of oil quality. Unless the lubricant is capable of demonstrating efficient service, it is dear at any price. And SERVICE is not a difficult quantity to measure—it shows in performance.

The subject is one worthy of careful consideration. The mechanical and operating departments—as well as the purchasing—are interested, and in a position to judge service values at first hand. Their opinion is indispensable to intelligent selection.

Lubrication costs will be found high or low, exactly in proportion to the service results obtained. With the inevitable poor service that marks the use of cheap oils, the small savings made through their lower first cost is lost many times over in the expenses of repairs and depreciation caused by their shortcomings.

When the lubrication question is considered from all angles—when efficient service and ultimate economy are the deciding factors—Galena Oils will be found the only logical choice. They are now used by over five hundred electric properties.

"When Galena Service Goes In
Lubrication Troubles Go Out!"

QUALITY-SERVICE-ECONOMY — GALENA OILS — G S O C

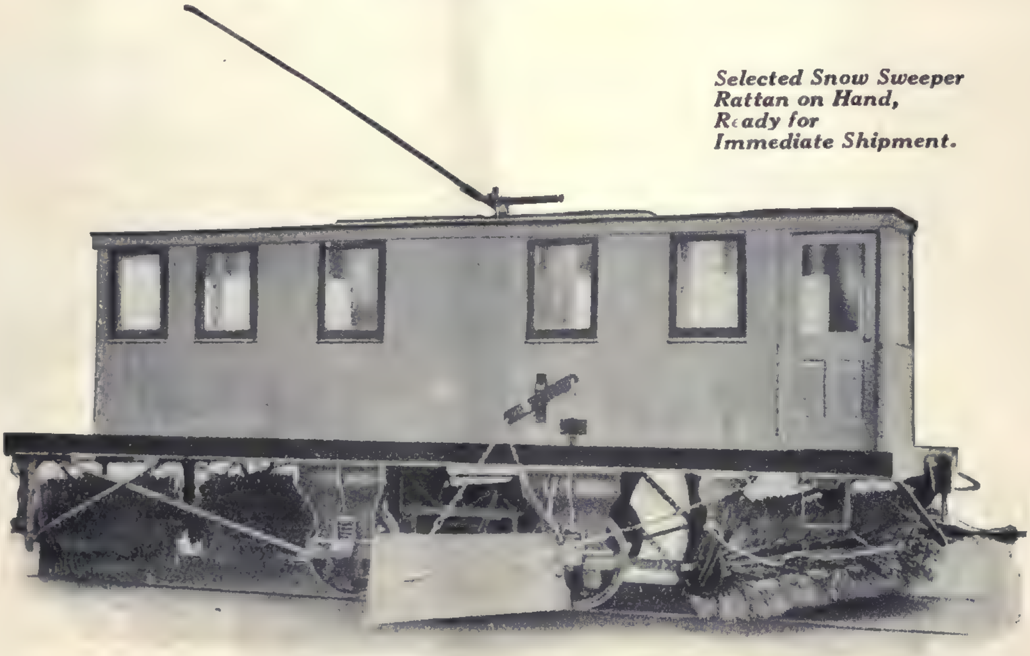
Galena-Signal Oil Company

New York • Franklin, Pa. • Chicago

and offices in principal cities

QUALITY-SERVICE-ECONOMY — GALENA OILS — G S O C

Snow Fighting Equipment



Selected Snow Sweeper Rattan on Hand, Ready for Immediate Shipment.

Standard Single Truck, Steel Underframe Long Broom Sweeper

Approximately ninety-five per cent of all the electric snow sweeping equipment, which is used in the United States and Canada, is of McGuire-Cummings make.

The car illustrated here is one example. The brooms are so arranged that they will clean both rails ahead of the car; the side plows will clear 4 ft. 0 in. outside of rails.

It requires two 25-hp. motors to propel the car, and one 25 to 40-hp. motor geared to drive brooms at 300 to 350 r.p.m.

Blueprints and specifications will be submitted on request.

End view of Standard Single Truck Sweeper.

McGUIRE-CUMMINGS MANUFACTURING CO.

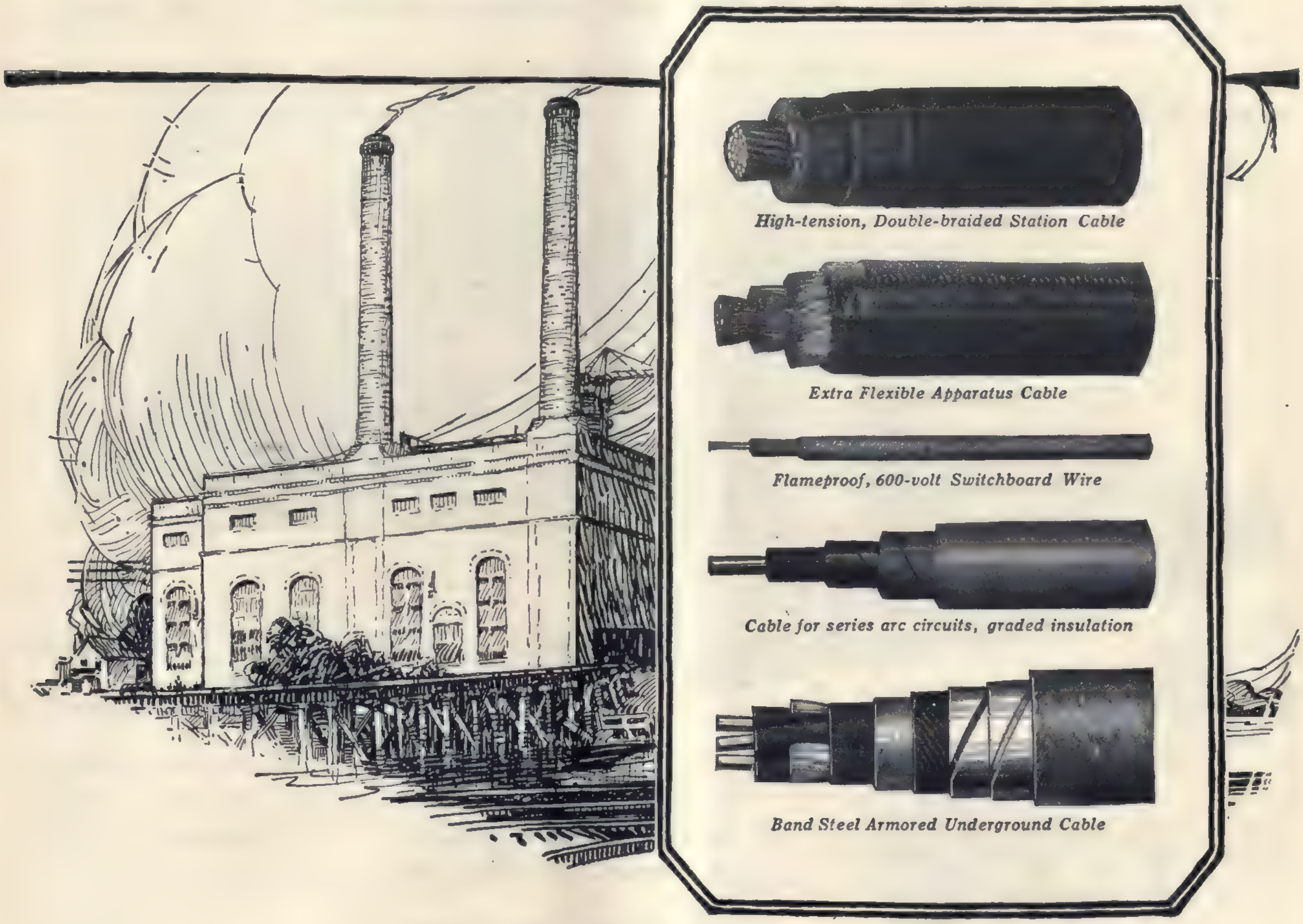
GENERAL OFFICES

111 WEST MONROE STREET

CHICAGO, ILL.

City and Interurban Cars and Trucks, Safety Cars, Combination and Work Cars, Snow Sweepers, Electric Locomotives.

Cables that insure transmission service



High-tension, Double-braided Station Cable

Extra Flexible Apparatus Cable

Flameproof, 600-volt Switchboard Wire

Cable for series arc circuits, graded insulation

Band Steel Armored Underground Cable

High dielectric strength
Resists moisture
Uniform insulation
Durable

These outstanding features of G-E Varnished Cambric Insulated Cable brought it immediate success after the initial installations just 20 years ago. Its application has since been widely extended.

G-E power-cable manufacture is based upon experience in designing the many varieties required by G-E equipment—a recommendation second to none.

Descriptive Bulletins will be sent you on request.

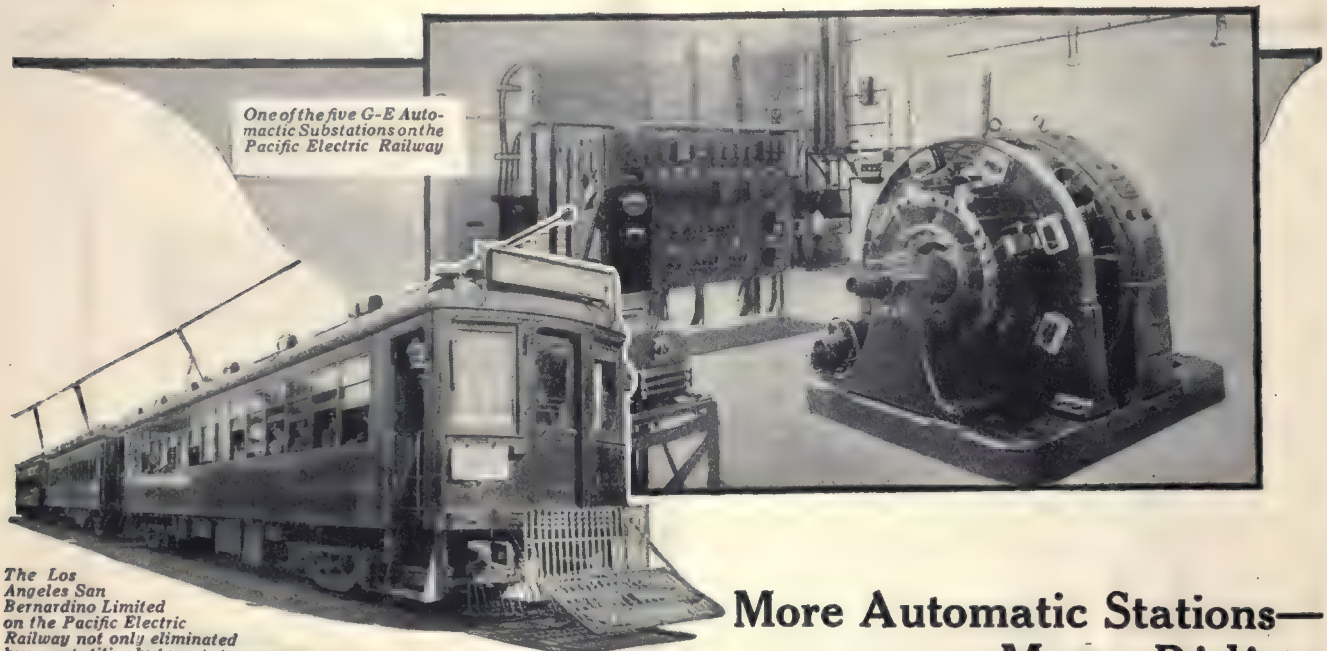
General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

37-39

The electric interurban railway of today cannot prosper with the equipment and transportation practices of the past



One of the five G-E Automactic Substations on the Pacific Electric Railway

The Los Angeles San Bernardino Limited on the Pacific Electric Railway not only eliminated bus competition but competes successfully with three steamrailroads

RAILWAY SUBSTATION ECONOMIES

GENERAL ELECTRIC COMPANY
SCHENECTADY, NEW YORK

Bulletin 44093 sent upon request.

More Automatic Stations—More Riding

If the automobile has made the cross-country passenger impatient with the more-than-hourly headways of the interurban, it has also had the result of making him ride oftener.

The benefit of this increase in riding habit can be made to accrue largely to the electric interurban railway if it adopts the means necessary to attain shorter headways at higher speeds.

The automatic direct-current substation—a General Electric development—offers the most effective yet least expensive way, permitting the saving in substation man-power to be transferred to the operation of more cars and the improvement in line voltage to go into the attainment of faster schedules and better illumination.

For up-to-the minute information on automatics write our nearest office.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-154

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Consulting Editor
HENRY H. NORRIS
Engineering Editor
C.W. SQUIER
Associate Editor
CARL W. STOCKS
Associate Editor
DONALD F. HINE
Associate Western Editor
R. E. PLIMPTON
Editorial Representative

ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

HENRY W. BLAKE, Editor

HARRY L. BROWN
Managing Editor
N. A. BOWERS
Pacific Coast Editor
H. S. KNOWLTON
New England Editor
G. J. MACMURRAY
News Editor
PAUL WOOTON
Washington Representative
ALEXANDER McCALLUM
British News Representative

Volume 60 New York, Saturday, October 28, 1922 *Number* 18

Government Ownership in France Assailed in Chamber of Deputies

THOSE who profess to believe that government ownership and operation of public utilities provides the best public service will find scant comfort in the report of a special committee of the French Chamber of Deputies announced this week in Paris. Immediate sale of the French government telephone system to some private organization is recommended so that the people may have the benefit of the development which comes from private initiative.

France has frequently been referred to as a shining example of government ownership of utilities. But now, coming on top of the well-known move to replace the government-operated railroads in private hands, the recommendation to do likewise with her telephones is somewhat of a shock to public ownership advocates. Particularly must this be true when it is read that the telephone system is admittedly the worst in the world; that it is in the grip of a political organization with numbers of useless politically appointed employees; that its operation is such as to discourage additional patronage and that if France wants real telephone service it must turn to private initiative, which alone has shown itself capable of developing utility service to the best interest of the customer.

The report is made not from theory but after extensive investigation of telephone service in the United States, Sweden and Norway. It is thus not only a tribute to the utility service of the United States but also a studied conclusion based on fact. It recommends a privately owned and operated system subject to government regulation like the scheme followed in the United States.

Experience Has Shown State Ownership of Utilities Is Undesirable

CONTRIBUTING materially to knowledge on the advisability of state ownership of water powers, which is now being advocated in several states, is a recent address by P. S. Arkwright, president of the Georgia Railway & Power Company, Atlanta, Ga. The occasion was the meeting of the Association of Edison Illuminating Companies at White Sulphur Springs a couple of weeks ago. An abstract of the address appeared in the Oct. 21 issue of *Electrical World*. It is of interest to electric railway men because of the fundamental principles involved.

Stated briefly Mr. Arkwright pointed out these facts: In the middle of the last century various states, in their endeavor and anxiety to develop railroad communication within their borders, built railroads by the use of state funds and state credit. Practical experience with public operation, with the attendant political patronage, proved conclusively to all of these states the inefficiency, the impracticability of successful government operation. In other words, it failed and the roads were sold or leased. Eleven of the states repudiated their debts. Finally every state in the Union, except Connecticut, Massachusetts, New Hampshire and Vermont, provided, either by constitutional clause or amendment, a definite prohibition against any similar future use of state funds and credit, setting forth the principle of the use of public funds for necessary governmental functions. Consequently, all attempts to authorize state ownership of water powers or other commercial enterprises today will require in most states a constitutional amendment to open gates which were once judiciously closed.

There Can Be Standardization Without Stifling Initiative

IN THE FIELD of electric railway engineering, committees and individuals are striving to bring better order out of what was once chaos in the design of rails, special trackwork, track details, car parts, car bodies, overhead construction and details, etc. In spite of this, designs in some parts of the field are being modified more actively at present than ever before; in other words, what the mathematician would call the "rate of change" in design has a high present value. Does this mean that the efforts of the standardizers are in vain? Have they been wasting their time these many years? The answer is, emphatically, No! They should be encouraged in every way to keep up the good work, for they are exerting a restraining influence upon unnecessary invention—or useless differentiation—and will gradually evolve a body of standards that almost everybody will accept.

Superficially, there seems to be a conflict between standardization and invention. One tends to stabilize things, the other to change them. One seems to discourage ingenuity and originality, the other to stimulate them. An association after years of study no sooner selects, say, some rail sections which seem adapted to track requirements, when along come a number of new designs. An attempt is made to select certain uniform features in car design, while new designs are popping up over night. What does all this mean? It means, on the one hand, that the work of standardization is not stifling originality. It means, on the other, that much deference is still paid to time-honored "local conditions." It does not mean, however, that the standards are not exerting a powerful influence. There is no means of knowing what "local conditions" would have done with designs without this wholesome restraint. And the effects of "local conditions" are not all bad, because they have often furnished the stimulus needed to cure some widespread ailment and produced something worth standardizing later.

It would be unfortunate if the more progressive engineers in the electric railway industry were divided into two extreme groups respectively of standardizers and inventors, with a neutral group of followers in between. It would be far better for all to be striving for that state of mind which welcomes progress in both directions. That is, the ideal engineer is one who will strive to assist in the standardizing of all that is inherently standardizable, while still being alert to improve the standards through use and to fill in the gaps by the aid of invention. Like legislators and lawyers, some engineers lean toward codification; others, like social reformers, are interested most in reformation. Both types are useful, to themselves, to each other and to the neutrals. The standardizer should, however, expend his effort principally on widely used products of simple character; while the inventor should make the widest possible use of all available standards. As far as possible each should absorb the spirit of the other.

New Methods in the Selection of Employees

SO MUCH depends, both in safety of operation and financial results of an electric railway, on the proper selection of employees that it seems strange so little attention has been given to the subject from a scientific point until recently. For many years the matter was left on small systems to the superintendent of transportation and on large systems to an employment agent, who, except for an examination for physical requirements and references as to character, depended largely upon his judgment as to the men to be engaged for the positions of motormen and conductors. Those who were most successful in choosing among the applicants for jobs were considered "good judges of character," but they had few methods which they could explain to others as to the way in which they exercised their judgment, except to say that their decision was based largely upon the appearance of the applicant, his method of replying to simple questions, and possibly a few mental rules which each person charged with this work had drafted for his own guidance.

Probably the first serious efforts in this country to lay down more definite methods to guide in the selection of employees were made by Martin J. Insull, when general manager of the Louisville & Northern Railway & Lighting Company, some ten years ago. Mr. Insull became impressed with the occurrence at times of what he called "man failure" among electric railway operatives, and in a letter to this paper published Feb. 17, 1912, urged that a fund be raised large enough so that the problem could be studied from a scientific point of view at some of the well-known universities which have given special attention to psychological investigations. Shortly thereafter he got in touch with Professor Münsterberg, then professor of psychology at Harvard University, who had been giving considerable attention to psychological research as applied to the selection of employees, and some work was done along the lines of the scientific selection of platform men on the Boston Elevated Railway system, but Professor Münsterberg's death put an end to these experiments.

The need for quickly and systematically determining the most eligible candidates for promotion in the army at the time of the war greatly stimulated the study of this question and, as most people know, various tests were prepared and applied under the direction of the division of psychology of the Medical Department, United States Army. They proved so successful that they or modifications of them have gradually become introduced in industry, and the reports last year and this year of the committee on personnel and training of transportation employees of the Transportation & Traffic Association have greatly stimulated interest in the subject in the electric railway industry.

The most extended investigations into the subject, with the possible exception of those of Professor Münsterberg in 1912, are those recently conducted by the Market Street Railway of San Francisco, referred to briefly in the paper by Mr. McCants in the last issue of this paper and given more detail in this issue, where tests were made of a number of men on the system. The results thus obtained were supplemented by personal information furnished by the division superintendents. The industry is to be congratulated on the production of these records, for they afford a practical demonstration of how to go about the application of more scientific methods in hiring trainmen.

Broadly speaking, they are more instructive from what they disprove than from what they prove. "Good motormen," to quote the report, "are not born, but are made of good substantial human material." So far as this survey goes, the best qualifications for a good motorman are intelligence, health and contentment, the last including absence of domestic and financial worry—homely virtues these, but the foundation of good citizenship.

The investigations at San Francisco have been largely along the lines of oral and written tests, and in this respect they differ from some of those used abroad and the apparatus of Professor Münsterberg, which provide for measuring the physical reaction to events similar to those which would be experienced on a car. The difference is interesting and the trials at San Francisco should be only the beginning of the study of this topic. Further information is greatly needed.

Large System vs. Individual Operators in City Transportation

THE hearings now being conducted by the New York Transit Commission on bus operation have brought out a number of interesting facts and several charges of graft. Whether or not these are correct, one point at least has been clearly shown. That is the great superiority of regular and regulated transportation service over that conducted by individuals under little or no regulation and with uncertain financial responsibility. According to the testimony, there has been greater crowding on the buses than ever there was on the subway, and lines have been leased to operators who had little capital so that there is now a total of more than a million dollars in potential damage claims against the city. Probably one of the reasons that there has been intolerable crowding of buses in the rush hours is that an adequate number of buses to handle the peak load would increase the difficulty for the individual owners to make profits on account of the resulting surplus of buses in non-rush hours.

Some of these troubles come about, probably, because it is more difficult to control a large number of independent operators than one large company, and it is obvious that the latter can introduce more scientific and reliable operation and better discipline than is usually practicable for a large number of individual operators. Incidentally, this constitutes one advantage on the side of the city for electric railway operation. Electric cars have to be part of a co-ordinated system, which is not necessary with buses.

Dayton Operates Large Light-Weight One-Man Cars

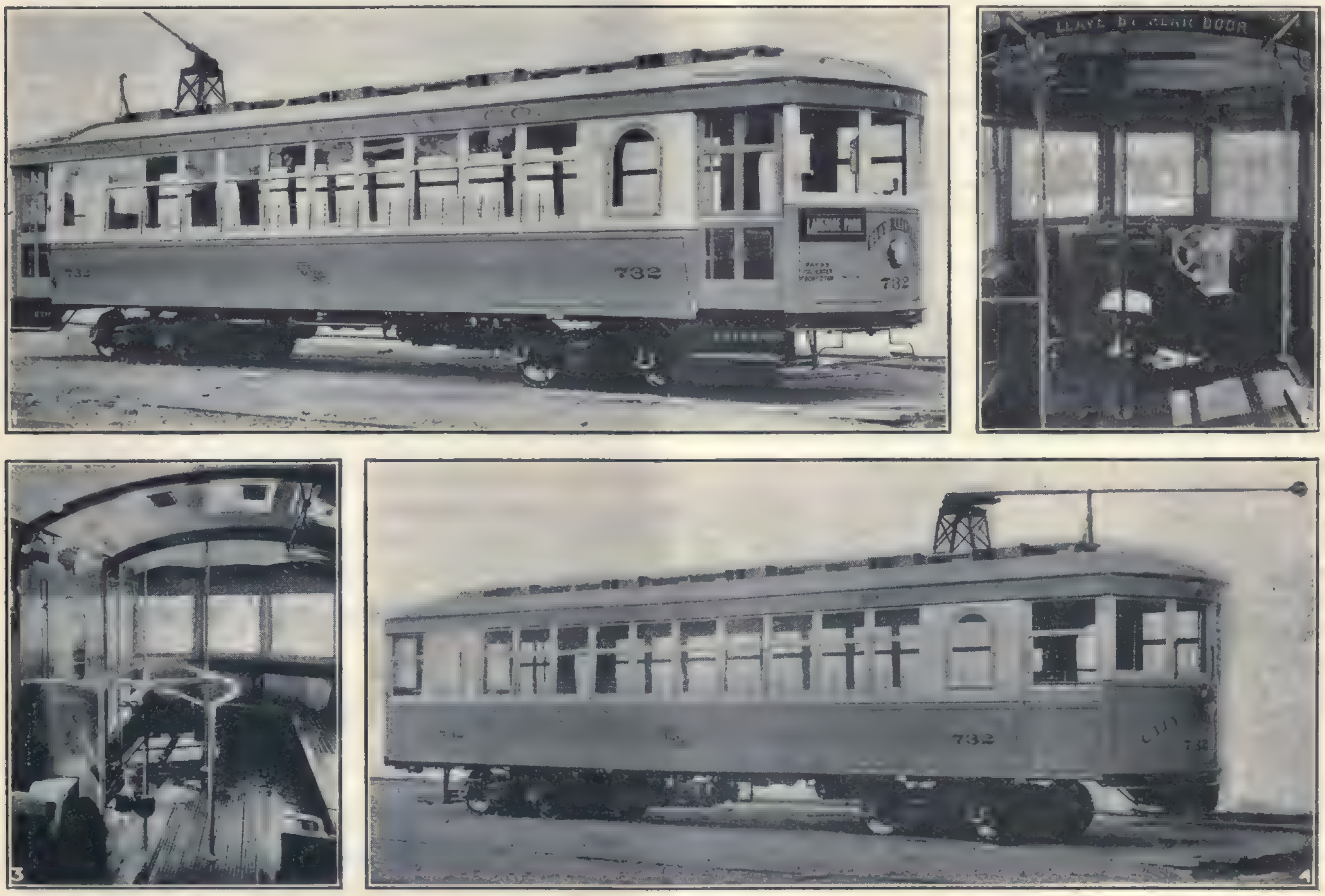
New Cars, 42 Ft. Over All, with a Seating Capacity of Fifty-one and with a Weight of Less than 500 Lb. per Passenger Seat, Are Operated Satisfactorily by One Man

THE City Railway Company of Dayton, Ohio, has recently placed in service fifteen new one-man cars, which provide large seating capacity with exceptionally light-weight construction. Advantage has been taken of the experience gained by other companies operating one-man cars to incorporate in this new rolling stock all of the advantages and at the same time eliminate some of the points which have appeared somewhat questionable. Painted in colors of dark and light yellow, these cars present a very attractive appearance, and due to the oval top windows at each end present somewhat the appearance of an interurban car. When compared with other cars operated by the City Railway Line, they appear somewhat lower due to their having 26-in. diameter wheels and an arch roof, which also lends to the low appearance.

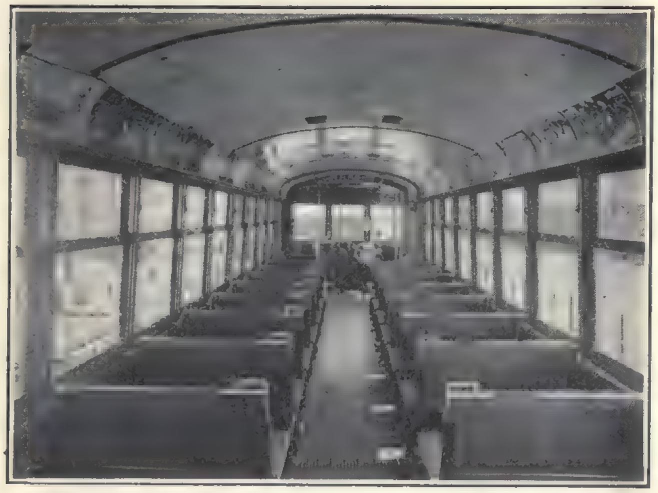
The extreme width of these cars is 8 ft. 4⅜ in., but the sides are curved inward below the rail belt to a narrower width, which is of advantage, particularly in Dayton at points where parking of automobiles limits the clearances for cars to a very low amount. Another noticeable feature of the exterior of these cars is the stationary steps. The management of the railway feels that this type of step causes fewer boarding and alighting accidents. Certainly they are less expensive to maintain than a folding step. The step construction is such that the outside edge of the step is in line with the upper side of the car body, so that no additional clearance is necessary. As all the lines in Dayton are arranged for loop operation, these cars are single end, which also has simplified the construction to a marked degree, and one side of the car is entirely without doors or steps. The low car made it necessary to elevate the trolley stand, and in mounting this the construction which has become quite familiar on Birney cars is used.

GENERAL DIMENSIONS AND DETAILS OF DAYTON CAR CONSTRUCTION

Length over dashers	41 ft. 11 in.
Length over body	33 ft. 3 in.
Length of platform	4 ft. 4 in.
Rail to top of trolley board	10 ft. 5 11/16 in.
Rail to bottom of side sill	28 11/16 in.
Rail to step	16 in.
Step to platform	14 in.
Ramp in car floor	2¼ in.
Post centers	30 in.
Clear height inside	7 ft. 3 in.
Extreme width	8 ft. 4⅜ in.
Bumper extension	2 in.
Width of seats	36 in.
Width of aisle	25 in.
Door opening	36 in.
Truck centers	23 ft. 9 in.
Wheelbase	5 ft. 0 in.
Diameter of wheels	26 in.
Seating capacity	51
Weight, completely equipped	25,300 lb.



No. 1—Side of Car with Entrance and Exit Doors. No. 2—Operating End of Car. No. 3—Turnstile Installation at Exit Door. No. 4—Side of Car Without Doors



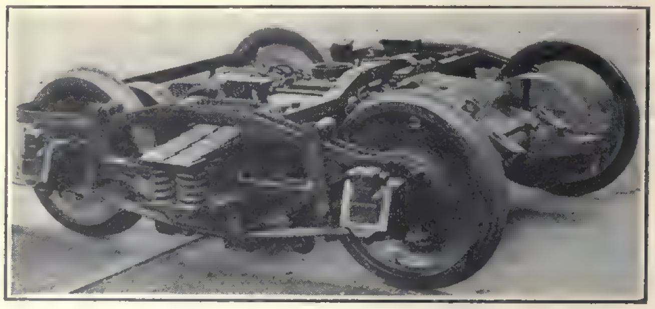
Interior and Seating Arrangement, Looking Toward Operating End

These cars are operated as pay-as-you-enter, with the rear door used as an exit. As a barrier to prevent entrance at the rear door, each car has a Syracuse car turnstile, furnished by the Turnstile Car Corporation, Syracuse, N. Y. However, since the introduction of this type of car in Dayton, the traveling public has become so familiar with the method of entrance and exit that observation shows practically no attempt being made to enter the rear door. The various painted signs have also proved of advantage in directing passengers. On the front end at the right-hand side is a sign reading "Pay as You Enter Front Door." Above the front step is the word "Entrance," and above the step of the rear door is the word "Exit." The lettering of the cars has been kept as simple as possible. Above the windows on the side is "The City Railway Company," and in the center below the windows is a square which incloses the words "City Railway Lines." The words "City Railway" also appear in a semi-circle over the headlight and underneath the trolley catcher at the front and rear ends of the car. Other than this the numbers are the only additional lettering which appear at each end and also on the sides at both ends.

A feature of the construction which is of extreme interest to those maintaining car equipment is that used for the windows. A metal strip runs down between the windows of each pair. This can be readily removed and thus the windows can be lifted out. The window guards which extend up to a height of about half the lower window are also held in place by this construction, and they come out at the same time as the windows by loosening the metal strip. The lower window sash are arranged to raise; the upper are stationary. There are two steps, the distance from the ground to the first step being 16 in. and from this step to the platform 14 in. A ramp in the car vestibule of 2¼ in. is also used. A liberal door opening of 36 in. is provided. Sliding doors operated by pneumatic door engines are used.

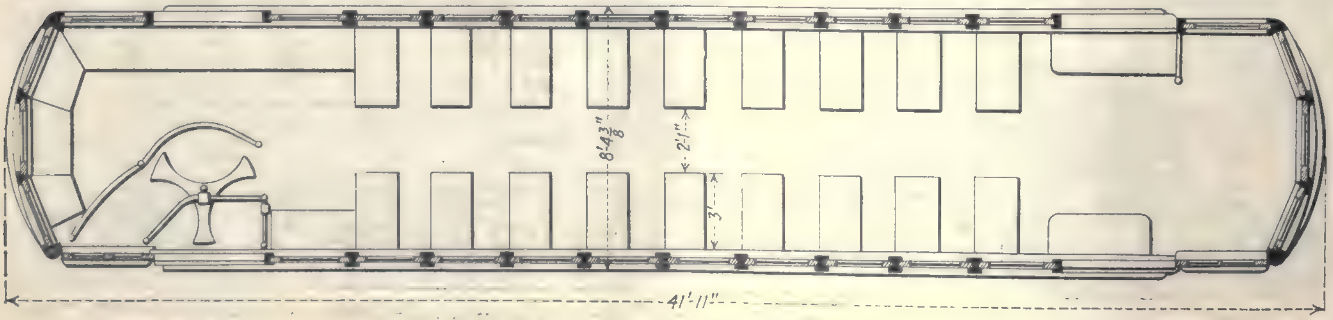
A vertical white metal pipe stanchion is provided just inside the door opening which is of convenience to passengers boarding and alighting. On the entrance end just to the right of the operator is a short pipe stanchion on which is mounted a fare box. This is used only as a fare box support and does not extend to the roof. Another pipe stanchion a little farther toward the car body serves as a support for the motorman's seat and is provided with a back. This stanchion extends to the roof and the upper part is fitted with a support for a curtain, which is arranged to pull down back of the operator, so as to shield the windows from the glare of light inside the car body. Another pipe stanchion is provided at the front end just at the end of the left-hand longitudinal seat. The car trimmings are of aluminum and white metal stanchions are used throughout.

At the rear of the car stationary seats are provided along the left-hand side and extending around the end, the space at the other side being occupied by the turnstile and a pipe railing for directing the flow of passengers as they leave the car. The seats are a cherry stained, flat type, the aisle corners of the back being provided with grab handles. A particular feature of the seats is their width of 36 in. The aisle width is 25 in. Straps for standing passengers are used in front of the longitudinal seats at both the front and rear of the car.



Type of Truck Used

The headlining of the car is of agasote fastened with cherry molding, and the illumination of the car body is furnished by ten lamps of the 50-watt mill-type series. burning 120-volt. This type of lamp is short and has a frosted bottom, and when lighted gives uniform illumination and presents a very attractive appearance. Lights are also provided for illuminating both the entrance and exit steps. At the front a single lamp with a shade is set just inside the dasher at the floor level in a space provided. This illuminates the step in a very effective manner. At the rear a bank of five lamps is located over



Floor Plan of Dayton One-Man Car

the doorway. With lights in this position, the step is not only illuminated but also the street surface at the car door.

The City Railway of Dayton is changing a number of its cars from hot air to the electric system of heating. The heater equipment consists of thirteen cross-seat and three panel heaters. Type 405-EB Gold Car Heating & Lighting Company's heaters are used. These heaters have interchangeable elements, supports and coils. They are of a two-coil type, both coils being alike. An additional vestibule heater located just to the left of the operator is also used. This is a Gold Type 144-E 600-volt, 1,200-watt heater. Gold Car Heating & Lighting Company's thermostatic control is also used for the heaters and the coils are arranged in two circuits. The control provides for all heaters being cut in and out at the same time, and should the thermostatic control become inoperative, heat is shut off from the car, so that notice of the trouble will be given immediately in order that it can be repaired.

The safety devices are the same as have been used by the Eastern Massachusetts Street Railway for a considerable time. An emergency cord which runs through the car is provided, and pulling this cord trips the circuit breaker, operates the emergency valve so as to apply the air brakes and balances the air pressure in the door engines so that the doors can be opened by hand if desired.

The trucks are the Cincinnati Car Company's arch-bar combination elliptic and coil spring type. Each truck is equipped with two GE-264 motors, which makes four motors per car. K 35-HH control is used. The air brakes are Westinghouse and a DH-16 compressor is used. The trucks are also provided with Gould slack adjusters.

Other features of the equipment include a Cleveland fare box, Hunter destination signs, Gebhart safety door signal equipment, Consolidated Car Heating Company's buzzers, H. B. life guards and O. B. type trolley catchers. The cars were built by the Cincinnati Car Company and are of all-steel construction. An accompanying table gives some of the principal dimensions.

Car Cleaning on the Illinois Traction System

The Car Cleaning Is Carried Out on a Regular Program Whose Details Are Given—The Work Is Done by the Transportation Department

BY J. B. HUGHEY

Superintendent Sleeping and Parlor Cars, Illinois Traction System

WE OF the Illinois Traction System think that one of the very important features of passenger service on electric railways is clean, comfortable cars. For this reason early in 1914 a car cleaning department was established to take over the cleaning of cars formerly done by the operating department. The primary business of the car cleaning department is to keep all cars, stations, etc., clean. At the more important terminals both day and night shifts are kept, each shift working under a foreman who gets his instructions from the head of the department.

Each foreman is permitted to select his own men and is held responsible for the condition of the cars departing on his shift. The department is supervised by the writer, in addition to his other duties. The work of the car cleaning department described below is that followed on all passenger cars, not simply on the sleeping and parlor cars.

Each car cleaning foreman is supplied with a blank form as follows:

"....................Terminal
Date........................
Report of work done on car No......which was
a layover at this station from.....M. to.....M.
1. Were the spittoons removed and cleaned?..... How many on car?..........
2. Floor of car well swept?............. (A2) Then mopped?..........
3. Windows cleaned inside and outside?..........
4. Interior woodwork and lamp globes wiped and dusted?..........
5. Were parcel racks cleared of papers, etc., and dusted?..........
6. Was water cooler emptied, cleaned, refilled and replaced?..........
7. All inside partition glass cleaned?...... (A7) Hopper washed?..........
8. Floor of toilet room swept and scrubbed..........
9. Motorman's cab cleaned and supplied with clean spittoon?..........
10. Was the stove room thoroughly cleaned?..........
11. Were seat pedestals wiped off with oiled waste?.....
12. Were seat covers turned, changed or adjusted? State which.........
13. Were the platforms and trap doors swept and scrubbed?..........
14. Was the car wiped or washed down on the outside? State which..........
15. Were the steps cleaned?.......... (A15) Glass in folding door cleaned?..........
16. Did you make a personal inspection of this car to see that it was clean and in proper shape for service?......
17. What time was the inspection made?...............
Remarks..
....
....

Each foreman is required to fill out one of these forms for each car that is a layover for more than three hours in his terminal, and if all items above mentioned are not done, the reason must be given on a separate paper which is to be attached to the report of the car in question. All reports, together with time slips for each employee, are sent to the office of the superintendent. The work in detail is as follows:

THE WORK IN DETAIL

1. The spittoons are removed and washed in a strong solution of Creo-Sul disinfectant by means of a bucket and short handle brush. A small portion of disinfectant is left in each spittoon.

2. The floors of the cars are swept dry, except in cases where they are to go out right away. Then the sweeping compound is sprinkled on the floor. In all cases a few windows are raised on each side so as to let the air in and dust out. All hair No. 16 or No. 14 push brushes are used.

3. The windows are cleaned with Bon-Ami, applied with sponge, when they need it, but are always wiped off with clean dry waste when the cars are cleaned.

4. The interior woodwork and lamp globes are wiped and dusted on all of the cars which are all-night or all-day layovers. If the cars seem particularly to need it, this cleaning is done regardless of the length of the layover time.

5. The parcel racks are given attention on every car cleaned.

6. The water cooler of every layover car is emptied and washed out. It is steamed at regular intervals and is filled with fresh water and clean ice a short time before it is set for the reception of passengers.

7. The partition glass is cleaned when this work is needed.

7A. The hopper bowls are washed out on all layover cars. A strong solution of Creo-Sul and a special hopper cleaning brush are used.

8. The floors of the toilet rooms are of course swept when the other parts of the cars are swept, and when a scrubbing is needed, it is given with a broom and plenty of strong disinfected water. We give this work a number on the blank so that the foreman in his general inspection will have to look at it to answer the question truthfully.

9. The motorman's cab is cleaned and always supplied with a clean spittoon.

10. The stove rooms have to have special attention to keep papers, fuel, etc., that are thrown behind them on the road cleaned out.

11. The seat pedestals are wiped off with lightly oiled waste when they look dull. It brightens them up and they look much better.

12. By seat covers, we mean what are sometimes called "tidies." They are 27 in. wide and are tied over the seat backs so as to keep the dirt from the heads of passengers off of the plush and also, and this is the main reason for having them, to furnish an unquestionably clean place for the tired passenger to lean his weary head.

13. The platforms are always of course swept, but they are scrubbed only when they need it.

14. When a car is on a layover long enough, it is wiped down on the outside with clean dry waste, or if the weather is bad and the car is in no condition to wipe, it is washed with water, brushes with handles 10 ft. long being used.

15. This work is the same as described under 13.

15A. This work is like that under 7.

16. We consider this one of the most important of the list. Every foreman has positive orders to make a personal inspection of every car that is to go out on his shift to see that it is in proper shape for service or, if not, to have it put in shape.

17. So that we shall know what time the foreman was on the car, etc.

The time required for one man on this work is about as follows:

No. 1	5 to 8 minutes	No. 9	10 minutes
No. 2	25 minutes	No. 10	10 minutes
No. 3	45 minutes	No. 11	10 minutes
No. 4	15 minutes	No. 12	10 minutes
No. 5	5 minutes	No. 13	10 minutes
No. 6	5 to 20 minutes	No. 14	......
No. 7	Included in 3	No. 15	20 minutes
No. 7A	5 to 10 minutes	No. 15A	
No. 8	10 minutes	No. 16	5 minutes

Thus it will be seen that it requires about three hours time for one man to do the work on one car for what we term a quick terminal clean. This work is done both by day and night wherever the cars are layovers and we keep a force.

The general cleaning is always done during the day and requires ten hours for each of five men. Quite a bit of additional work also is done. The program in general cleaning is about as follows:

The cars are placed on a rip track and compressed air, furnished at most points from a neighboring power house, is used in blowing out the plush upholstery. The compressed air is also used to blow out the accumulation of dirt from under the heater pipes and other places that cannot be cleaned by sweeping.

The woodwork is washed with a good neutral soap and rinsed with clear water, and when it is dry an application of a harmless renovator is used. The floor is then scrubbed, windows shifted and the glass cleaned on both sides of both sash. A final touch up with a clean cloth is made so as to get off any of the renovator that may have been left. The lamp globes are removed and washed if need be and clean seat covers are placed in the car. Then the outside of the car is gone over with some effective cleaner which is washed off with clear water by the use of a hose and car washer brushes. When dry a renovator is applied to the paint on the outside of the car and then is wiped off with dry clean waste.

THE WOODWORK IS WASHED ONCE EVERY SIX MONTHS

Compressed air is used on the cars as often as needed, but the woodwork is washed but twice each twelve months, except in cases where cars have been occupied by persons with contagious disease. In that case the woodwork is thoroughly washed and the car is fumigated with formaldehyde and permanganate of potash mixed together, which makes a very strong and effective fume. This work is done also regularly in March or April and again in October.

To comply with the federal laws regarding the cleaning of water containers, coolers, filling cans, etc., the company has a steam line into the car yards or car-houses at most important terminals. Steam is furnished from the neighboring power house and a record is kept of the date when the coolers are steamed.

In connection with the car cleaning department the company also operates a small laundry. While this is maintained chiefly for the purpose of taking care of the linen used on the sleeping and parlor cars operated by the company, the seat covers used on the coach seats as well as the cleaning rags are washed there at a very reasonable cost.

The renovators which we use are special No. 10, made by the Cymol Chemical Company, and the Brooks renovator.

We have found it best to have the car cleaning department a part of the transportation department of the company rather than a part of the mechanical department of the company. One reason is that coach cleaners can usually be employed for less than one has to pay a mechanic. While we work in perfect harmony with the mechanical department, each has its own foreman with duties which do not in any way conflict with those of the other.

The repair shops of the company are at Decatur and whenever a car is taken there for either light or heavy repairs it is in charge of the mechanical department. The nature of the repairs may result in an accumulation of some dirt so the cars are always swept and otherwise cleaned ready for operation before they are returned to service.

Welding Practice of the Pacific Electric

The Extent of the System and the Large Amount of Special Trackwork Used Give Welding Operations Particular Importance—A Large Amount of Welding Is Done on Both Open and Paved Tracks

By Clifford A. Elliott
Cost Engineer Pacific Electric Railway, Los Angeles, Cal.

AN IDEA of the extent that welding operations are of value to the Pacific Electric Railway can be gained from a brief summary of the extent of the system and the large amount of special work employed. The system comprises a total of 1,105 miles of track, of which approximately 250 miles is located in paved streets. There are more than 118 railroad crossings alone with steam lines and more than fifty-five complicated special work layouts in the streets of Los Angeles. A portion of the company's tracks are of combination gage construction for joint operation with the Los Angeles Railway, which is a narrow gage line, and this complicates the construction of the special trackwork.

The company has made use of welding in connection with track repairs for the past ten years and has organized special welding gangs for carrying out all important work of this nature. The first welding machines employed were of a grid resistance type quite similar to the machines now being marketed by the Indianapolis Switch & Frog Company. These machines were built in the shops of the company at Los Angeles, a royalty being paid the patentees. These early machines were 2 ft. x 4 ft. x 6 ft. in dimensions and mounted on a wheel-base weighing approximately 1,250 lb. Direct current was used at a potential of from 550 to 600 volts. Four of these machines were constructed and are still in use on the system.

Due to an increase in the amount of welding work necessary, additional equipment has been placed in service as follows:

Five Indianapolis Switch & Frog Company's 600-volt resistance type portable welding machines. Four of these are used in city work and one in open trackwork.

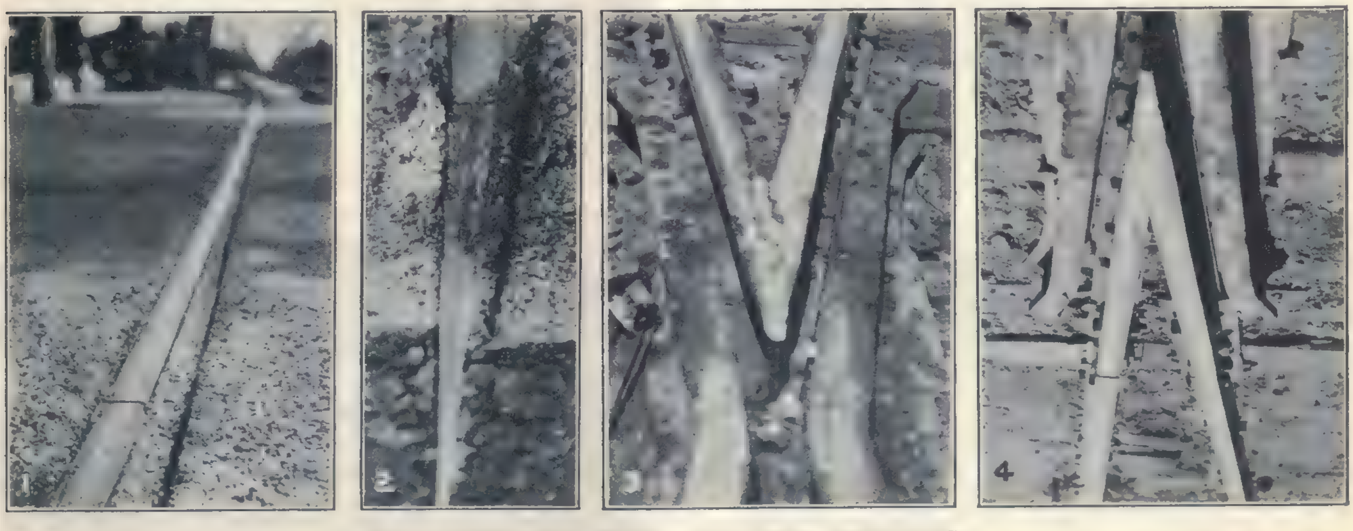
One No. 3 welding torch.

Welding Equipment in Bonding Shop. D.C. Outfit at the Right with A.C. Outfit at the Left

Two acetylene cutting torches for various work.

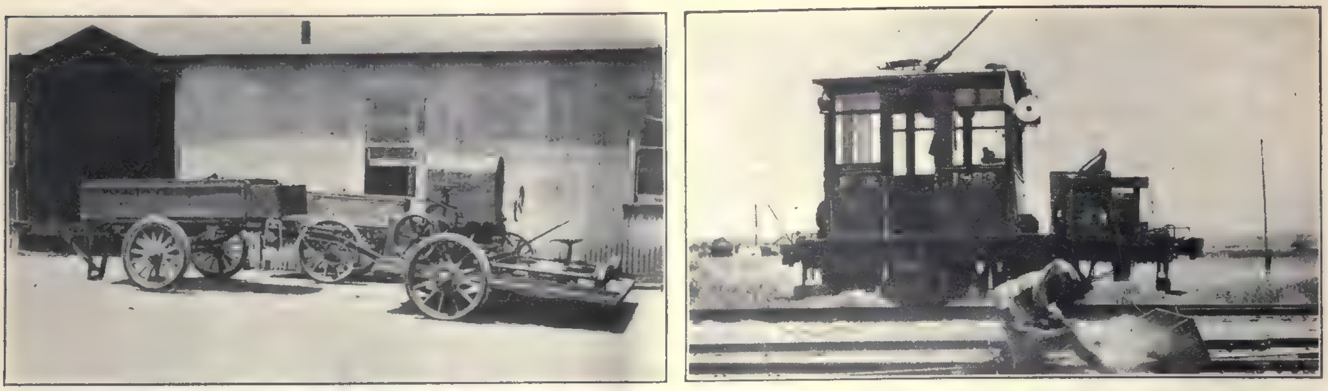
One 500-volt portable resistance welder of the Electric Railway Improvement Company's make. This machine is used for welding work in city streets during the daytime where immediate emergency repairs are required which cannot wait for night forces.

Welding is now found of advantage for a large variety of repairs. In the reconstruction of tracks in paved streets, bolts and nuts are now welded on special work and at rail joints. Nut-locks are omitted as the depositing of metal on the end of the bolt just outside the nuts prevents them from coming loose. Under normal conditions one welding foreman and one helper can weld 1,522 bolts in eight hours. In this work 1 lb. of welding steel is needed for twenty-four bolts welded, the size of the bolts being 1 in. x 4½ in. This particular job was in a paved street where automobile traffic was light and where the average interval between cars was fifteen



RAIL JOINTS AND FROGS AND AFTER REPAIRING

No. 1. Worn rail joint at oil-macadam paved road crossing.
No. 2. Same joint after being built up, ready for grinding.
No. 3. Open track frog point turnout with worn point.
No. 4. The same frog point after repairs are completed.



At Left, Rail Grinder Coupled to Welding Machine for Hauling to Job. At Right, Welding a Worn Frog Point by Use of Equipment Mounted on Special Line Car

minutes. This method of welding bolts has proved very satisfactory.

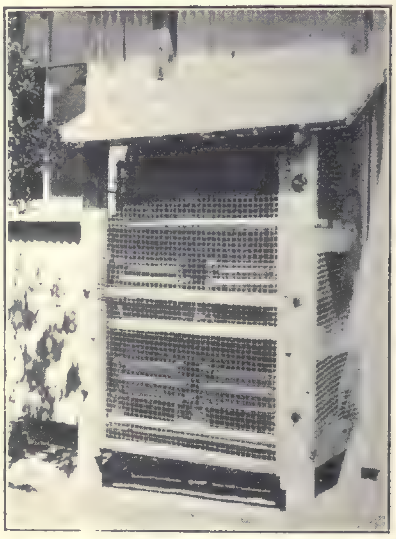
Another use for welding which has cut costs considerably is in the building up of rails in the field to form a compromise joint at railroad crossings where both a heavy girder rail and a light section low T-rail are used. The life of special trackwork has been increased considerably through the use of welding equipment in making repairs. Previously repair work prolonged special trackwork life from three months to eighteen months, but the use of welding, together with more efficient methods, now prolongs the life from one to three years.

With open track construction the building up and welding of battered rail ends at joints has proved very satisfactory. The company maintains more than a thousand highway crossings at various points on its lines and these locations are the ones where the large majority of the work is necessary.

Accompanying illustrations show some of the work being done at an oil-macadam paved crossing. After one of the joints was rebolted and the ties renewed and tamped the rail end of the joint still showed a worn surface of $\frac{1}{8}$ in. extending back for a distance of 28 in. In building up this joint the tread side of the rail was completed first, so as not to interfere with the passing of trains. After the welding was completed the joint was ground down with an Atlas rail grinder. Another illustration shows a frog pointed in a turnout in open trackwork which was reclaimed by electric welding.

The company's present welding force consists of four foremen, four welders and three helpers, who are all under the supervision of a bonding supervisor. By this system the bonding supervisor can give this work his individual attention for the entire system and give closer supervision, which results in much better work than by having the force subject to the partial supervision of the general track supervisor of each division on which they may be working.

Every effort has been made to give welding work special attention at all times. Welding forces have been impressed with the fact that satisfactory work requires special skill and attention. For making the welds and building up joints the highest grade of welding steel obtainable has been used. Acme special round tool steel $\frac{3}{16}$ in. in diameter, which is a high-grade carbon steel, has been found very satisfactory for reclaiming railroad crossings, frogs, switches, joints, bolts and special work. The Indianapolis Switch & Frog Company's grade B welding tool steel $\frac{1}{4}$ in. in diameter is used for welding all manganese crossings, frogs, switches and special work.



Mounting of Grid Resistors Outside Bonding Shop

Another point which has been given special study and attention is the manner of transporting the machines to and from the job. At first an auto truck was used for this purpose, which hauled the welding equipment installed on a trail truck. While this method was satisfactory for city use, it could not be used for reaching repair work in open track or where the tracks operated over private right-of-way. To meet these con-

At Left, Two Welding Machines Mounted on Rubber-Tired Wheels for Transporting About City Streets. At Right, Working with a 500-Volt Portable Resistor Welder ditions a special line car is used. This line car was fitted up in the company's shop and the welding equipment is made a permanent part. The current for welding is taken from a tap on the trolley pole through a 250-amp. circuit breaker. This safeguards the equipment in case of short circuit or line interference.

A special cart has been designed for handling the rail grinder. This is constructed as low to the ground as possible in order to make easy the handling of the grinder on and off the cart at the point where the work is done. This cart can also be coupled to the welding machine so the two can be transported to any desired location at the same time.

In addition to the portable welding equipment the railway also has a direct-current grid type outfit and an alternating-current welding set installed in the engineering department's bonding shop. In order to provide for efficient ventilation of the resistors used with the d.c. outfit these are mounted outside the shop building and are screened with a coarse wire screen. An accompanying illustration shows this mounting. Other equipment necessary, such as circuit breakers, switches and connecting cables, is mounted above a work bench inside the building. The a.c. equipment consists of a transformer, switches and other necessary apparatus. When the welding forces are not required on trackwork, there is always plenty for them to do in the bonding shop. The work done consists of reclaiming and welding various bonding tools as well as track, bridge and signal tools. The equipment is also used for repairs to pneumatic tie-tamping and paving-cutting tools, which require frequent attention.

New uses for welding equipment are being found constantly which increase its field of usefulness and the Pacific Electric Railway, like most other railways that have had experience in welding, now considers this as a most essential part of its maintenance equipment.

Continuing Old-Type Motors in Service Is Costly

Modern Motors Require Maintenance Expenditures About One-fourth Those for Obsolete Types, Besides Producing Other Economies in Fewer Pull-Ins Less Weight and Faster Service

By H. G. Morse
Railway Engineering Department, General Electric Company, Schenectady, N. Y.

THERE are still in active service in this country some thousands of railway motors from twelve to twenty years old which ought, on the score of reduced maintenance costs alone, to be retired from service and replaced by machines of modern design. If to this be added the greater reliability of the new motor and the consequent fewer failures in service, the reduction in weight and the greater schedule possibilities, it will be found that there are few properties that could not show an interesting return on such an investment.

An average of figures recently compiled shows that the cost of keeping a twenty-year-old motor in service is four to five times that occasioned by a modern type even when the latter is as much as five years old. Before discussing the reason for so great a difference, some actual figures will be illuminating. On a large Eastern property during 1920 on cars in active service the records show that of 3,785 motors of twelve years average age, 25.5 per cent or 1,004 armatures were rewound, while for the same period 609 motors of an average age of five years required 8.7 per cent or fifty-three armatures to be rewound. This, as can be seen, is not a record of brand new motors. As a matter of fact, only about 15 per cent of the second group had been running less than two years, while 40 per cent had been in service for seven years.

On another large Eastern system in 1920, 1,885 motors of obsolete design, used mainly in tripper service and therefore worked less severely than on all-day runs, averaged $7.30 per 1,000 motor-miles for repairs and inspection, whereas 1,412 modern type motors in regular service averaged only $1.19 per 1,000 miles in their fourth year of operation.

On a property in the Southwest 220 old-style motors in 1921 averaged $4.49 per 1,000 motor-miles, and 104 much later design motors averaged $1.42, although in their ninth service year. A large part of the older motors were used only for tripper service, while the later motors were on cars kept on the road to the maximum extent. Another system in the South reports costs on their older motors, of which approximately 1,000 were in operation in 1920, ranging from $2.50 per 1,000 miles for the best to $5.40 for the worst, averaging $3.75. This compares with 50 cents per 1,000 miles on 100 modern motors in service for five years.

Instances like these could be recounted indefinitely, but these are sufficient both in geographical location and quantities of motors involved to prove the case for the new motor. Experience shows that modern motors properly applied should not cost for repairs and inspection more than $1 per 1,000 motor-miles during the first five to seven years, or from $30 to $40 per motor annually to keep them in first-class operating condition. On most motors put in service prior to 1912 operating costs will average $120 to $200 annually on the same mileage basis.

The reason for these big differences is simply the rapid advance that has been made in railway motor design and construction over the past ten years. Better understanding of insulation and ventilation problems and improvements in mechanical design and construction have resulted in a motor of less weight and greater reliability. An examination of repair charges to old-type motors will show that a large percentage of the trouble is due to armature failures with repairs to fields, brush-holders, gears and pinions and to accessory equipment in the order named. The armatures of new motors are better insulated, better ventilated and of better mechanical design so that they are fundamentally improved. Armature and axle bearings are waste packed and oiled, which in itself is a vast improvement over grease lubricated motors.

A large percentage of armature failures is due to armatures getting down on the pole pieces, which is directly traceable to insufficient lubrication of bearings. It is very difficult to get satisfactory oil lubrication on motors designed for grease, as any master mechanic will testify. Field coils are now better supported in the motor, almost eliminating failures from grounded fields due to chafing. Brush-holders have been improved and creepage distances increased, which, with the use of commutating poles, has substantially reduced flashovers. Most street railway systems operate at 600 volts nominally, with peaks considerably above this. As most of the older motors were designed and insulated for 500 volts, this increase in voltage results in a high mortality. Split-frame motors have given way to box frame; better fitting frame heads and bearing caps have replaced the old. These betterments are reflected not only in the direct repair expense, but indirectly in the increased yearly mileage due to less time spent in the repair shop.

SAVES IN PLATFORM EXPENSE TOO

Many other improvements could be cited to show the greater reliability of the modern motor. The direct saving in maintenance will frequently show 20 to 25 per cent return on the cost of replacement, while the other savings may add considerably to this. A case in point is New Orleans, where it was found that by substituting modern machines a faster schedule could be operated, as the new motors were capable of more rapid acceleration and higher free running speeds, and that fewer cars with new motors could provide the same service with material economies in the cost for platform wages.

The reduction in weight that can be obtained by motor replacement, with the consequent saving in power cost and track maintenance, is appreciable and should be considered. One type of motor suitable for single-truck, two-motor cars weighs 1,500 lb., as compared to 2,850, 2,450, or 2,180 lb., respectively, for three of the older motors which it will replace. It is evident, therefore, that on a two-motor equipment, from 1,360 to 2700 lb. can be saved, and 2,750 to 5,400 lb. on a four-motor car. A still further reduction in weight can be secured by dropping the cars down onto low-wheel (24 in. to 26 in.) trucks and utilizing low-wheel motors. A saving of about 2,000 lb. per truck and 100 lb. per motor can be made in this manner.

The Winnipeg Electric Railway has done this with nearly 200 old cars, equipping them with 26-in. wheels and GE-258 motors. More recently the Dayton (Ohio) City Railway has re-equipped fifteen cars that had maximum traction trucks and two 65-hp. motors with 26 in. wheel trucks and four 25-hp., G.E.264 motors and saved considerable weight.

Summarized, there are many places where motor replacement can be justified by the reduction in maintenance expense and increased reliability of service. In other cases the ability to make a better schedule may be the determining factor. In others the necessity of pulling trailers may force the use of larger motors, while elsewhere the desirability of lowering step heights and reducing weight may bring about the motor replacement. There are without doubt similar conditions existing on most railways where the replacement of obsolete motors would bring material economies in addition to the saving in motor maintenance. It would well repay operators to give the situation on their own properties a thorough examination.

Food Costs Show 1 per Cent Increase

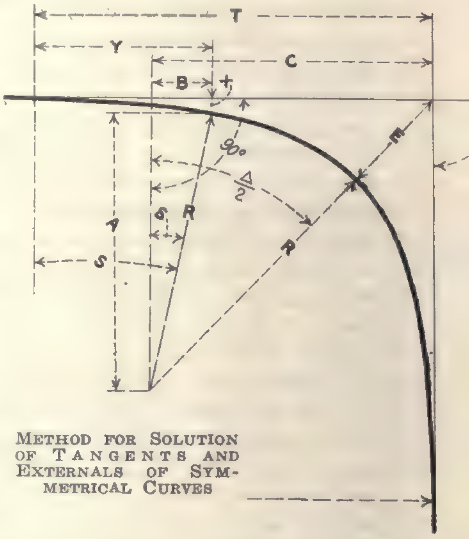
THE retail food index issued by the United States Department of Labor through the Bureau of Labor Statistics shows that there was an increase of 1 per cent in the retail cost of food to the average family in September as compared with August. For the year period Sept. 15, 1921, to Sept. 15, 1922, the percentage decrease in cost of all articles of food combined was 9 per cent. For the nine-year period Sept. 15, 1913, to Sept. 15, 1922, the increase in all articles of food combined was 36 per cent.

Solution for a Compound-Curve Trackwork Problem

A Simple Method for Finding the Tangents and Externals of Symmetrical Curves in Special Trackwork, Using Available Tables

BY L. R. BROWN
Office and Field Engineer New York State Railways, Rochester, N. Y.

FROM time to time there have appeared in the columns of this magazine formulas and methods for solving compound-curve problems. Since the advent of the standard spiral or switch easement, the most frequent problem encountered in the designing of special trackwork curves is the computation of the tangent distances and externals of curves where a standard spiral is used at either end of a given center radius. There are tables given by the steel companies which give the *X*, *Y*, *S* of each of their standard spirals. There is also a booklet put out by one company which gives tables showing these dimensions for the A.E.R.A. recommended spirals. Thus in nearly every case these dimensions as well as the center radius and total angle are known.



METHOD FOR SOLUTION OF TANGENTS AND EXTERNALS OF SYMMETRICAL CURVES

The problem, then, is to solve the tangent distances and externals. This problem, of course, is easily solved by trigonometry and there are several methods of doing it. Much time is wasted in the drafting room in computing these problems unless a given method already worked out and checked is used. If a copy of the formula is at hand it is only necessary to substitute in the formula. It likewise saves time in checking the computations.

The simplest method found by the writer for solving the above problem is that given by the following formula. This method can be used only where the same spiral is used on each end of the curve.

Given: *X*, *Y*, *S* of any spiral, *R*, the center radius, and Δ (see figure).

Find: *T* and *E*.

$$A = R \cos S$$

$$B = R \sin S$$

$$C = (A + X) \tan \frac{\Delta}{2}$$

$$E = \frac{A + X}{\cos \frac{\Delta}{2}} - R$$

$$T = C + Y - B$$

In the Jan. 17, 1920, issue of the *Electric Railway Journal* the writer gave formulas which could be used for solving the *X* and *Y* distances of any spiral in case a railway company used a standard spiral of its own instead of already existing standards.

Equipment and Its Maintenance

Short Descriptions and Details of New Apparatus of Interest to the Industry. Mechanical and Electrical Practices of All Departments

Efficient Method for Washing Cars

The New Carhouse of the Detroit Municipal Railways Is Equipped with Perforated Pipes, from Which a Spray Is Applied to the Car Bodies as They Are Operated Back and Forth

Among the novel features incorporated in the new St. Jean carhouse of the Department of Street Railways, Detroit, is a spray system for washing cars. It consists of four perforated vertical spray pipes, arranged in two pairs. These are located at the sides of the washing track. A 2-in. pipe is used as the main feed pipe, and this is reduced to 1½ in. at the control valve, and below this to 1¼ in. at the regulating valve and then to 1 in. and ¾ in. at the bottom. Two rows of holes are provided in the bottom sections, with 1-in. centers at the top and ¾-in. centers at the bottom. All holes are 0.082 in. in diameter. The water for washing is taken directly from the fire line of the shop. To provide for cars of different heights, a slotted bushing is placed over the upper portion of the spray pipe. When the slot is turned away from the holes, the latter are covered, thus preventing the water from shooting over the roofs of low cars.

Washing a Safety Car in the Detroit Municipal Shops

In washing a car it is moved slowly between the first pair of spray pipes, and in order to loosen the dirt the car is stopped while two men with long-handled brushes go over the car on each side. With the dirt loosened, the car is moved slowly past the second pair of sprayers, which rinses the car clean. The safety cars of the Detroit Municipal Railways have hinged metal window guards, which can be turned down out of the way while washing is being done.

The valves for operating and controlling the flow of water are manipulated from the floor by means of ropes. The washing crew consists of four men, one of whom operates the valves. As soon as the car has passed through, this man helps with the washing. The motorman stays inside the car during the washing and takes it away immediately after the job is finished. This method enables the washing of a safety car to be done in two and a half minutes, and its use has resulted in reducing the cost of car washing to a considerable extent. This equipment was devised by Fred Weld, master mechanic of the system.

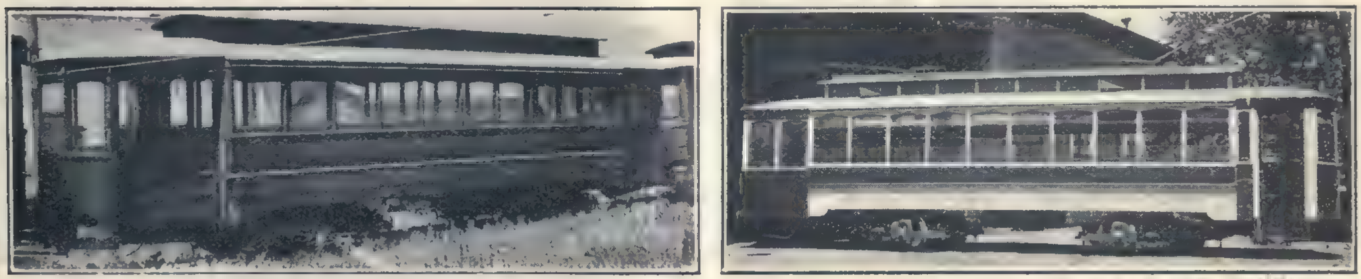
Trailers Converted to Motor Cars

By George R. Green

Superintendent of Equipment Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.

The Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., is now engaged in rebuilding and equipping ten second-hand trailers, to be operated as one-man motor cars. Five of them have already been converted into motor cars at a cost of $2,158 each, exclusive of the cost of the motors and controllers, which the company had on hand. The cars are 41 ft. 8 in. in length over all and seat forty passengers. They have Brill trucks, two 40-hp. motors, 30-in. wheels and DH-16 compressors. The weight of the cars has been kept down to approximately 30,000 lb., every precaution having been taken to remove any surplus material.

The cars are arranged for double-end operation, but have single doors manually controlled. The company's experience with doors has shown that while it takes a slightly longer time to load and unload passengers during peak-load riding, yet the operator has far better control of the boarding and alighting of passengers with the single door. On the remodeled car the rear door is held in a closed position by a magnetic pneumatic locking device which is controlled by the circuit breaker on the operating end of the car.


Ten Trail Cars Like the One Shown at the Left Are Being Converted Into One-Man Motor Cars, of Which the One in the View on the Right Is a Sample

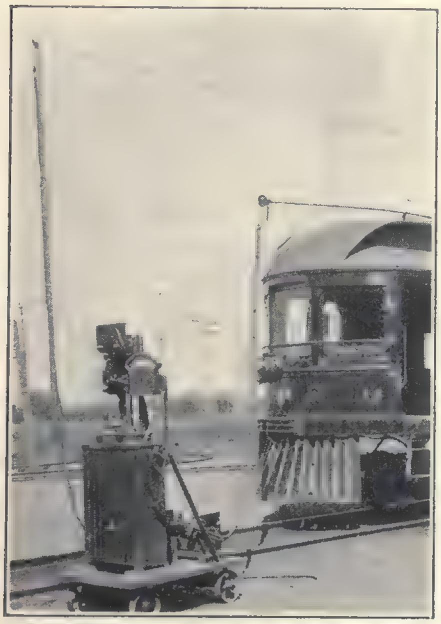
Besides the addition of the motors, control and electrical equipment to the trailers, the rehabilitation work consisted chiefly in the elimination of the rear doors, the addition of window guards and painting of both the inside and outside of the car body. When these ten cars are completed and put in service the railway will have twenty cars of this type available.

Convenient Circuit Breaker Testing Outfit

The Indiana, Columbus & Eastern Traction Company Uses a Portable Outfit in Connection With the Standard Car Equipment for Setting Circuit Breakers

BY F. J. FOOTE
Superintendent of Motive Power and Equipment, Indiana, Columbus & Eastern Traction Company, Springfield Ohio

ANY ONE who has operated an electric car, or has stood by a motorman during his efforts to get a car over the road on time against adverse conditions, such as poor power, bad grades, slippery rails, etc., can appreciate the temptation to fast feeding when the need arises. This fast feeding is rarely justified, however, as it usually results in damage to the equipment. The most effective protectives against too rapid feeding are the fuse and circuit breaker. To a considerable extent the fuse has been superseded by the overload circuit breaker. The kind that is mounted under the car and the opening of which cannot be prevented by the motorman is in greatest favor among equipment men. This type of breaker, set to open at the proper current, and when kept in good order, gives excellent protection to the motors and controllers.


TESTING OUTFIT CONNECTED TO CAR READY FOR TEST

The question as to the proper current at which a car breaker should open will not receive the same answer from different equipment men, but the writer has found that the most satisfactory value for this is just enough to get the car up the grades existing in the district where the car is used, when the car equipment is in good order and properly operated. This current must be found by trial for each type of car. I have found that with a 44-ton passenger coach with four 100-hp. motors, 36-in. wheels and a gear ratio of 25:52 900 amp. is just about right.

Testing a circuit breaker is a very simple matter if one has at hand a source of current, a variable resistance, and a testing ammeter of proper capacity. However, many shops are not equipped with this apparatus, the shop over which the writer presides being one of these. It has been our ambition for some time to devise a method for testing the breakers on our cars, and a short time ago the writer conceived the idea that it would be possible to rig up an inexpensive device which could be used in connection with the resistance on the car itself, and the circuit breaker could thus be tested without removing it from car. With this in mind, the C.B. testing outfit shown in the accompanying illustration was made, mostly from old material found around the shop.

The outfit consists of a 1,200-amp. switchboard type ammeter, a G.E.-M.K. circuit breaker set at about 1,200 amp. for safety, a bank of cast-iron grid resistors, and part of an old L-4 controller—the whole being mounted on a low wheeled truck. (The 1,200-amp. circuit breaker is only supposed to open in case the car circuit breaker is stuck.) The resistance consists of thirty-six grids, No. N-3355, two in multiple, divided into six equal sections or steps, and connected to the controller fingers in such a way as to be cut out successively as the controller is fed up.

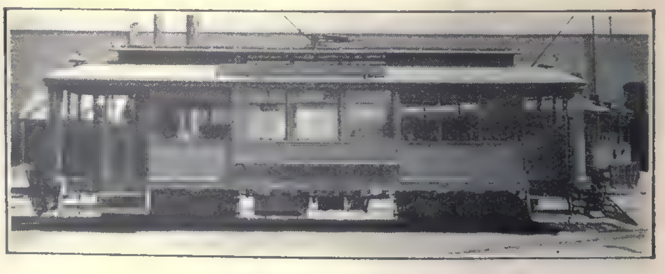
This outfit is provided with one incoming and one outgoing flexible cable, of ample capacity, attached to long poles and provided with stiff copper hooks at the terminals. In use the trolley pole of the car is fastened down, the incoming cable is hooked over the trolley wire, and the outgoing cable is hooked over the trolley wheel of the car. The air brakes are then set, and the car controller is fed up by a man on the car till the ammeter shows from 60 per cent to 75 per cent of the desired current, then the man at the testing outfit at once begins to feed up slowly till the car breaker opens, or the desired current is exceeded, in which case the breaker on the testing outfit is tripped and the car breaker is adjusted for lower current. The operation is then repeated, adjusting the car breaker each time till it opens at or near the prescribed current. By this method many defective circuit breakers have been discovered, some of which could hardly be opened with a crowbar.

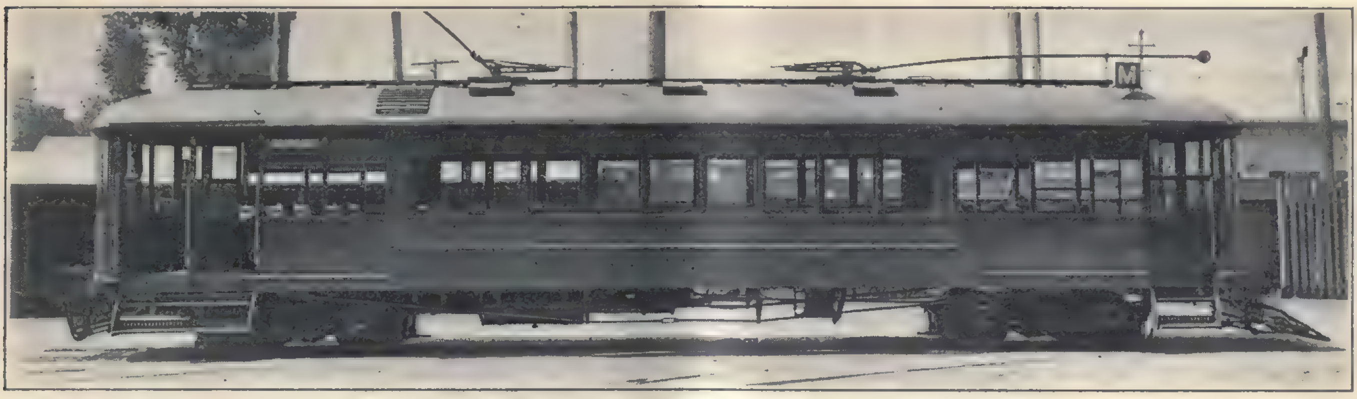
This testing outfit has been found satisfactory beyond the writer's expectations, on account of its inexpensiveness, ease and rapidity of operation and practicability. It is not uncommon to test a car breaker and make the necessary adjustments complete in twenty minutes.

The advantage of having the outfit on a truck is that it may be taken to a car, thus doing away with the necessity for switching the car onto a track where the outfit is located, which at times may be very inconvenient.

Car Reconstruction in Los Angeles

AS A PART of its program for reconstructing cars, the Los Angeles Railway has recently lengthened one of its 35-ft. cars seating thirty-four passengers so as to provide a car 48 ft. long, with a seating capac-


CAR BEFORE RECONSTRUCTION



RECONSTRUCTED CAR READY FOR SERVICE

ity of fifty-six. In this reconstruction the car was cut in two parts at the middle and the center section was enlarged, leaving the ends as they were originally. The center section is inclosed and the two end sections are open. In the reconstructed car cross-seats are provided throughout. The original car had longitudinal seats in the inside section. The seats are located opposite the windows and a signal push button is provided for each seat. Two-motor equipment is used.

The original car was equipped with magnetic brakes and was used in service on one of the hill lines. The reconstructed car has been provided with air brakes. An additional trolley pole has also been added, as was found necessary for the longer car. The clerestory of the old car, which was of monitor deck type, was removed and an arch roof was substituted. The original weight of the car was 33,000 lb. and the reconstructed car weighs 39,000 lb. The reconstruction was carried out by P. B. Harris, chief engineer of the company.

Insuring that Couplers Couple

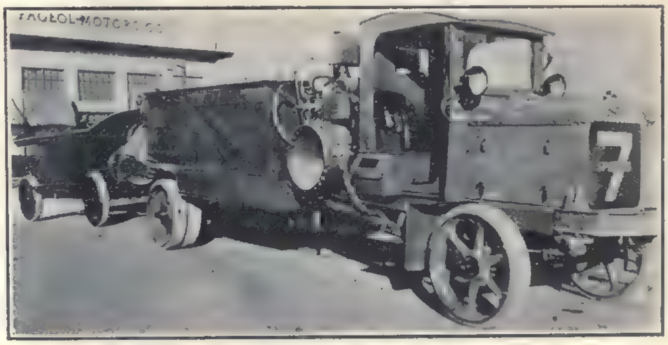
AS A literal link in the assurance that all equipment is in the safest possible condition for operation, the Cleveland (Ohio) Railway tests all couplers after any repairs on them have been made. Oftentimes the adjustment is disturbed when each surface of the two halves of a coupler have been machined. Also the working of the coupler may be imperfect because of a replacement of the tongue or the building up of the old one by welding. For that reason, the device shown in the accompanying view has been found effective in discovering defective couplers. One half of the coupler is pinned to the frame, while the other half is attached to the piston of an air cylinder bolted to the other end of the frame. Full shop air pressure of 100 lb. per square inch is admitted to the cylinder through the conductor's valve, the pull on the coupler thus established being much greater than ever will be encountered in actual operation. During the test the air is released from the cylinder and the two halves drawn apart and coupled several times to insure as well that all parts are in perfect working condition.

ALL COUPLERS OF THE CLEVELAND RAILWAY ARE GIVEN A TENSION AND LOCKING TEST AFTER BEING REPAIRED

Novel Highway Maintenance Truck

THE San Diego Electric Railway has recently placed a novel highway maintenance truck and trailer in operation. The truck carries all tools and material needed for the care of concrete, asphalt, macadam or dirt roads, for erecting concrete steel or wooden bridges, and for repairing or painting fences.

The truck is equipped with a concrete mixer, air compressor, centrifugal pump with self-priming device, and lengths of suction hose for filling the water tank from wells or rivers. The compressor has twin cylinders, and is driven by a belt from the forward drive shaft. A large air reservoir is mounted just behind the operator's cab and combination material bins are provided so that 1,000 lb. of cement, a cubic yard of sand, two cubic yards of gravel or rock can be carried. All bins have gravity feed to the mixing apron which is controlled by hand-operated gates.



HIGHWAY MAINTENANCE TRUCK AND TRAILER

The motor hauls a trailer which is specially designed with a side dump body for carrying rock, sand or other material. Other equipment includes a tar or road oil heating tank with gas furnace having a capacity of 50 gal., and a syphon nozzle for spraying the hot tar or oil under pressure with a hose. There are also a complete paint-spraying outfit with hose connection and a pneumatic rotary post hole digger with hose. The truck was manufactured by the Fageol Motors Company, Oakland, Calif.

Essentials of Carbon Brush Selection

High-Grade Brushes May Fail to Give Satisfactory Service Unless Brush-holder, Commutators and Motor Windings Are Kept in Proper Condition

By W. J. Overman

Railway Department, General Electric Company, Boston, Mass.

THE most sensitive parts of a railway motor, and in many cases the most neglected parts, are the brush-holders, brushes and commutators. While as a rule the same general practice in the care of the parts can be carried out on all properties, still in many cases there are conditions to be met which require considerable study on the part of the operator in order to obtain good motor performance.

The selection of brushes is of primary importance, but it must be remembered that even with brushes best suited to a particular type of motor, good results cannot be obtained unless proper care is given to other parts. Railway motors in their development have gone through stages which have given the various classes commutating characteristics quite different.

There are few of the non-commutating pole motors with commutators having flush mica now in service, but it must be realized that the brush selected for this type must contain enough abrasive to keep the mica cut down flush with the copper. The brush must also have a fairly high ohmic resistance to keep down the flow of current from bar to bar through the brush. This flow of current is caused by the difference of potential between commutator bars under the brush and increases in intensity as the electrical neutral shifts away from the brush. The motor manufacturers recommend a particular brush for this type of motor, having very little graphite and considerable abrasive material.

The non-commutating pole motor with undercut mica permits the use of a brush having little abrasive qualities and a much larger percentage of graphite than the brush recommended for non-slotted commutators. The brush must have a high ohmic resistance, however, as this type of motor has no commutating poles to prevent shifting of the electrical neutral.

Commutating poles introduce a counter emf. and the tendency for current to flow from one commutator bar to another through the brush is almost entirely eliminated. This permits the use of a highly graphitized brush having good lubricating qualities and a high current carrying capacity. The brush, being very soft, has slight scouring effect, and is rapidly destroyed by rough commutators, but when correctly applied, will cause practically no commutator wear, and will, in this way, effect considerable saving. With a few exceptions, a brush of this character can be used on all commutating pole railway motors. Tapped field railway motors sometimes require a brush similar to that used in non-commutating pole slotted commutator motors due to increased sparking which roughens the commutator.

From the foregoing paragraphs, it is evident that there is a reason for selecting a certain kind of brush for a certain type motor and that brushes should not be selected in a haphazard manner. Quality should be considered as of primary importance instead of price. A cheap grade of brush, even though containing a large amount of graphite, may have very poor lubricating qualities due to the use of cheap graphite.

The very best brushes may fail to give good results unless the motor is in good condition. Brush-holders should, of course, be in the correct position. With modern motors it is difficult to set the holders out of electrical central, but their position should be watched on some of the older types. The bottom of the brush-holder slot should be about $\frac{3}{16}$ in. from the face of the commutator and the brush-holder slot should not be allowed to become badly worn. This will allow the brush to shift, which sometimes causes poor commutation and broken brushes.

The pressure on the brush is very important and no definite recommendations as to the amount of pressure can be given, as it depends upon many variables. In order to prevent sparking, it must be great enough to prevent the brush from jolting away from the commutator under all operating conditions. Worn bearings, rough track and special trackwork and broken suspension springs all cause jarring of the motor, and this jarring is greatly aggravated in cold weather, due to lack of resiliency in the ground and track. A pressure greater than necessary naturally results in unnecessary wear, but sometimes operators find it necessary to increase the pressure to as much as 9 lb. per brush before good results can be obtained. Under such conditions, it is important to use the very best quality of brush obtainable in order to prevent excessive wear.

Many operators, on examining commutators which need turning, immediately attribute the trouble to mechanical wear and recommend decreasing the brush pressure. Sometimes serious mistakes are made in this way, and the commutator should be very carefully examined to determine whether it has been burned down or scoured down. A burned commutator usually has a blackened and roughened surface, while a rapidly worn commutator usually has a bright surface and is sometimes grooved. All slotted commutators, if equipped with proper brushes, will burn down rapidly after having worn down to the mica, and they should be removed, turned and reslotted before reaching that stage. If upon careful examination it is determined that the commutator has been scoured down, it should then be determined whether or not the proper brush is being used before decreasing the brush pressure. If the proper brush is being used, sandy or dusty roadbeds may be contributing to the trouble, particularly if the motor is the ventilated type. Brush pressures should rarely be less than 5 lb. per brush on any motor.

Some operators find it difficult to use the highly graphitized brushes recommended for modern commutating pole motors, but in most cases the difficulty may be readily overcome. It must be remembered that graphitized brushes will stick in the holders and give very little satisfaction if the bearing oil is allowed to get over into the motor casing where it may be thrown on the brushes. It is poor practice to allow such carelessness for other reasons as well, and it always results in dirty and grounded brush-holder insulated studs. It must also be remembered that brushes having good lubricating qualities have very poor abrasive qualities, and soft brushes will not smooth up rough commutators. On the contrary, the brushes themselves will be rapidly worn away and the brush of this type is very likely to be condemned for being too soft.

Highly graphitized brushes have been known to wear out in less than a day's running on commutators just out of the shop. To all appearances the commutators were smooth, and in the case which the writer has in mind, the brushes were condemned and brushes having less lubricating qualities were put in their place. The results were somewhat better, but not by any means satisfactory, and a further investigation was made. Upon examining the commutators with a reading glass, it was found that the sharp edges had never been removed from the commutator bars after the slotting process. The soft brushes were not abrasive enough to remove these edges of the bars and the result was that the brushes were rapidly scraped away. The trouble was easily remedied by drawing a "V" shaped tool through each slot between the bars and then sanding the commutator. No doubt the short life of many brushes could be traced to just such a neglect of detail.

Proper selection of brushes and proper care of the parts will effect considerable saving, and attention to these details is almost as important as keeping the bearings supplied with oil.

Letter to the Editors

Way Committee Report on Substitute Ties

BROOKLYN RAPID TRANSIT COMPANY,
BROOKLYN, N. Y., Oct. 26, 1922.

To the Editors:

Your editorial in the *Journal* for Oct. 7 on the subject of substitute ties seems to call for comment, particularly as criticisms of the way committee report on substitute ties is implied.

In the first place the report was clearly a progress report and I believe it is an error to indicate as you do that the sole basis of the report was replies from a questionnaire. There were other bases, such as the general experience of the committee members, many of whom have used and are using substitute ties in several forms. Some of the members have also had opportunity to observe the performances of substitute ties in cases where these ties have been removed for one reason or another. It is not surprising that you as well as others seem to err in thinking that the report was discussing forms of steel ties in particular, although it happens that most substitute ties used by electric railways have been in some form of steel. To take up your numbered criticisms in some detail:

1. The reference to incasement of ties in concrete, I believe, was intended to cover the use of wood ties, as it is well known that such an incasement of wood ties does protect them and prolong their life.

2. It is not clear to me that the use of substitute ties in most forms may not call for an added investment and there is a question as to savings effected unless some particular substitute tie is under review, and there is doubt that savings for some of these can always be had under all conditions of installations. The committee was not discussing "selling features."

3. The word "thoroughly" was inserted for the purpose of clearness and I note you interpreted it correctly. I believe the committee will search some time before it will find a substitute tie which will have most of the virtues of the wood tie. The latter is ideal in all but two points, viz., the ultimate decay and scarcity.

The steam roads are still searching for the proper form of substitute tie.

4. There is the ultimate maintenance cost of track to be considered. I believe any substitute tie which, as part of a substructure, cannot readily be adjusted when settlements occur, which cannot take another set of rails without causing a great deal of labor expense, and without leaving uncertainty as to how well the rails may be refastened, should be considered as not fulfilling the functions of an ideal substitute for the wood ties.

5. It is to be regretted that you referred to steel ties in your discussion. Assuming that the electric railways operate 40,000 miles of single track, there must be about 105,000,000 wood ties in use. There are perhaps 950 electric railway companies in the country. It is noted that 140 of them have used some form of substitute ties. Meanwhile it is understood that one of the largest users has this year installed only between 1 and 5 per cent of its former annual number, because of a reversion to the use of wood ties.

The report cannot well be taken to reflect upon any present form of substitute tie and was not so intended. It has at least done one thing, viz., created an interest in the study of a subject which is of constantly increasing importance to the industry.

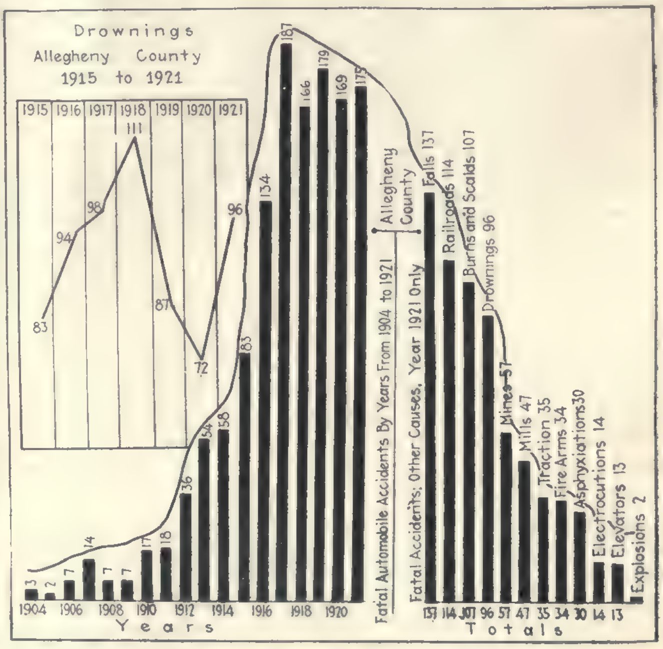
The forms of substitute tie in current use have merit for use under a number of special conditions, and for this purpose some of them have been used in Brooklyn at times and further use is even now under discussion for specific conditions.

R. C. CRAM,
Engineer Surface Roadway and Sponsor
for Committee on Way Matters for 1921-22.

Automobile Accidents Increase

CECIL G. RICE, ex-president American Electric Railway Claims Association, has been compiling statistics of accidents in Allegheny County, Pa., and among the results of these studies is the accompanying chart. With other figures compiled by Mr. Rice it has attracted considerable attention in the Pittsburgh daily papers.

The diagram at the left shows drownings for the last seven years, the reduction coming largely, in Mr. Rice's opinion, through greater vigilance at the beaches. A more interesting chart from a railway standpoint is the larger one illustrating the fatal automobile accidents by years from 1904 to 1921 and those from other causes for 1921 only. The remedy for automobile accidents in Mr. Rice's opinion is stricter examination of drivers before licenses are issued and stricter enforcement of the automobile laws against reckless driving.



ANOTHER LUMP TO REMOVE

Tests Used in Selecting Employees*

Detailed Study Made by the Market Street Railway, San Francisco, in the Nature of Research as to What Scientific Methods May Be Employed to Aid in Selecting Good Employees Is Here Presented

By M. McCants
Assistant General Manager Market Street Railway, San Francisco, Calif.

Below are the results of studies made under the direction of the research committee of the Market Street Railway of San Francisco. Of these studies those portions are included which have the most direct bearing on the report of the A.E.R.A. committee on personnel and training of transportation department employees.

Analysis of Best and Poorest Motormen

The research committee authorized direct contact with and study of about twenty-five of the best motormen in all divisions and about twenty-five of the poorest motormen in all divisions. Subsequently, five division superintendents were each asked to submit the names of the five best and the five poorest motormen in their respective divisions and to furnish certain personal information concerning each of them. In addition, the employment department was asked to furnish data from the application blanks of these motormen.

From April 4 to April 9 one of our men interviewed and gave standardized intelligence tests to groups of the selected motormen at their respective headquarters. Of the selected list of forty-nine, two were absent and could not be tested.

The materials forming the basis of this report consist of: (1) data from the application blanks of the selected men; (2) additional personal information furnished by the division superintendents, and (3) results obtained with general intelligence tests.

The plan of this report was to analyze all the above-mentioned data to determine what value, if any, each item may have in differentiating the best from the poorest motormen, and to point out the most significant facts to be considered in the selection of applicants.

APPLICATION BLANK

The primary function of an application blank is to obtain facts which will aid in the selection of the best fitted applicants. For this reason various items on the application blank will be taken up one by one to determine what value they may have in differentiating the best from the poorest motormen. The data studied are from the application blanks of twenty-four best and twenty-four poorest men.

Twenty of the best men were citizens when hired, as were also sixteen of the poorest. This bit of evidence, therefore, does not indicate that the item is of very great value in hiring motormen. Other statistics, such as married or single, color of eyes, hair, etc., with comments on the results, are given in the accompanying tables.

MARRIED OR SINGLE

	Best	Poorest
Married	14	12
Single	10	11

There is the merest shade of preference in favor of the married man.

PREVIOUS OCCUPATION

	Best	Poorest		Poorest
Laborer	5	4	Special officer	1
Farmer	3	1	Restaurateur	1
Motorman	1	1	Boiler maker	1
Carpenter	1	1	Millman	1
Salesman	1	1	Gardener	1
Miner	2	.	Dairyman	1
Soldier	2		Engine driver	1
Real estate	1	.	Grocer	1
Machinist	1	..	Railroad employee	1
Teamster	1		Stock raiser	1
Lineman	1		Car cleaner	1
Grocery clerk	1	..	Janitor	1
Locomotive engineer	1		Hotel clerk	1
Watchman	1	.	Mechanic	1
Butcher	1	.	Cannery foreman	1
Oil worker	1	..	Construction foreman	1

A careful scrutiny of the list of occupations from which these motormen have been drawn reveals no evidence of value in determining whether an applicant will become one of the best motormen.

COMPLEXION

	Best	Poorest
Dark	7	10
Fair	8	3
Medium	4	5
Ruddy	4	5
Sallow	0	1

These facts do not indicate that complexion has value in selecting suitable candidates.

COLOR OF EYES

	Best	Poorest
Blue	9	10
Brown	7	8
Gray	5	2
Hazel	2	2
Dark brown	0	2
Light brown	1	0

The above figures certainly do not give much weight to this item on the application blank.

COLOR OF HAIR

	Best	Poorest
Dark brown	9	9
Black	4	9
Brown	4	3
Medium gray	3	2
Light brown	2	1
Auburn	1	0
Red	1	0

Such facts as these would not indicate that this item (color of hair) has very great value in differentiating the applicants.

WEIGHT

Pounds	Best	Poorest
190 to 230	6	1
180 to 189	4	4
170 to 179	1	3
160 to 169	7	7
150 to 159	4	5
140 to 149	1	2
125 to 139	1	2

The best men range from 230 to 135 lb., with the median at 167½ lb. The poorest men range from 197 to 125 lb.; with the median at 162 lb. Apparently weight has little to do with the candidate's fitness for the job.

HEIGHT

Inches	Best	Poorest	Inches	Best	Poorest
74	1	1	68	6	1
72	2	1	67	1	4
71	2	2	66	0	4
70	4	4	65	0	3
69	8	2	64	0	2

Judging solely from the above statistics a motorman should not be less than 67 in. tall. The most obvious explanation presenting itself is that the short man is not in a position to have the widest field of vision; again, his lack of height may handicap him in the proper operation of the car. At any rate, if the company had set a minimum height of 67 in., nine of these poorest motormen and none of the best would have been rejected. With a minimum of 68 in. only one of the best and thirteen of the poorest would have been rejected.

Briefly, if further investigation continues to reveal such facts as these, the employment bureau will have a simple means of eliminating outright many unsuitable applicants.

AGE AT BEGINNING

Age	Best	Poorest	Age	Best	Poorest
51	.	1	33	1	..
48	1	..	32	2	..
46	..	1	30	1	..
43	..	1	29	1	1
42	..	2	28	1	..
40	..	2	27	1	2
39	1	2	26	2	..
38	..	1	25	1	..
37	1	3	24	1	2
36	1	3	23	3	1
35	1	..	22	2	..
34	3	2	..	..	..

From the above array of figures it may be seen that in age when beginning to learn car operation, the group of best men ranges from twenty-two to forty-eight years, with the median at thirty-one years, while the group of poorest men ranges from twenty-three to fifty-one years with the median at thirty-seven years. If the employment office had rejected all inexperienced applicants above thirty-six years, all of the best men except three would have been hired and thirteen of the poorest men would have been eliminated.

Such facts seem to indicate that the older men are not likely to develop into the best motormen. If continued in-

DEPENDENTS

	Best	Poorest
Wife	4	3
Wife and one child	3	5
Wife and two children	3	0
Wife and three or more children	4	3
Mother	3	2
Father	0	2
Father and mother	0	1
Four children	0	1
No dependents	7	7

Judged from the above facts, the case appears that the best and poorest are about equally blessed with dependents, and those who have no dependents at all are equally divided between the best and the poorest groups.

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*Abstract of appendices to paper on "Selection and Training of Employees" presented by Mr. McCants before the annual convention of the American Electric Railway Transportation & Traffic Association, Chicago, Oct. 2-5, 1922, and printed on page 679 of the Oct. 21 issue of *Electric Railway Journal*.

vestigation bears out this fact the next step would be to set a definite maximum limit which would, of course, not be made public; otherwise the applicant would be tempted to make mis-statements.

At the time of application every man denied that he used alcoholics; consequently, this item had no value in differentiating the two groups.

If the applicants born in Ireland, Greece and Italy had been rejected, ten of the poorest group and none of the best would have been eliminated.

The items of the application blank which, from a study of the two selected groups, seem to have value in distinguishing between the best and poorest men, are: (1) Height, (2) age at beginning, and (3) place of birth. The other items seem to be quite devoid of value. At present the foregoing items constitute the chief sources of information upon which the inspector of applicants must rely in making his selections. If this analysis is conclusive, it would appear that only three out of the score or more of items on the blank are safe guides.

INFORMATION FROM DIVISIONS

Of the informational items furnished by the division superintendents, only a portion throw any light on the problem of setting up distinctions between the two groups of the best and the poorest.

NATIONALITY

	Best	Poorest
American	17	9
English	2	1
German	1	2
Danish	1	..
Canadian	1	..
Welsh	1	..
Russian Jewish	1	..
Italian	..	3
Greek	..	3
Irish	..	3
Portuguese	..	2
Dutch	..	1
Syrian	..	1

From these figures it would appear that the Mediterranean races and the Irish afford poor material for motormen. Beyond that, nationality seems to play but little part.

NATIONALITY OF GRANDPARENTS

	Best	Poorest
Scotch	7	..
Welsh	4	..
Danish	5	.
Russian Jewish	4	..
American	45	12
English	9	10
French	3	3
German	13	10
Dutch	1	4
Portuguese	2	8
Irish	3	17
Italian	.	12
Greek	..	12
Syrian	..	4
Bohemian	.	4
Polish	..	2
Spanish	..	2

It seems from a study of the above figures that nationality of grandparents is more significant than the applicant considered his own nationality to be. Here again the Mediterranean races and the Irish are to be found predominantly in the group of poorest.

INSURANCE

	Best	Poorest
$2,000 or more	3	2
$1,000 to $1,900	5	5
$500 to $900	3	0
$100	1	1
Accident only	1	1
None	13	17
Total amount carried (not including accident or company insurance)	$11,500	$7,300

It seems that the group of best carries the more insurance. This might be explained by the fact that the group of best has had longer steady employment with the company and has therefore more money to spend for insurance.

Thirteen of the best and five of the poorest own real estate in some form. Possibly the poorer group would improve its showing if it were to continue in the service of the company for a period of time equal to that of the better group.

ENTIRE WEALTH

	Best	Poorest
$5,000 or more	5	3
$2,000 to $4,500	10	2
$1,000 to $1,500	3	2
$200 to $900	1	6
Undetermined	5	4
None	0	7

The median man of the best group has a financial wealth between $2,000 and $4,500 while the median of the poorest group is between $200 and $900. It is doubtful, however, if these facts have much value for the employment department except to indicate that the men who make the best motormen are the sort of men who accumulate more wealth than do the poorest motormen.

It was suggested by members of the research committee that financial worry tends to cause accidents. This opinion seems to have some basis as the poorest group has at least four cases, while the best group affords not a single instance.

Although both groups spent about the same amount of time in school (the median age at quitting school being fifteen years), the best group made a considerably better showing in that its median is the eighth grade, while the poorest group advanced only to the fifth grade. This is a very significant fact for it indicates the relative ability of the two groups. That native ability which enables one group to get into the eighth grade in the same length of time that the other group gets into the fifth grade enables the best group to develop into better motormen.

Four of the best group and six of the poorest group are reported to be somewhat given to the drinking habit.

Domestic infelicity is mentioned in connection with three of the poorest group, while none of the best group is so reported. Other statistics appear in the accompanying tables.

As a summary of the information from divisions, it might be said that the best group are more largely drawn from American or North European stock, while the poorest group tends to be drawn from Mediterranean and Irish stock. The best group carries more insurance, owns more real property, possesses greater total wealth and completes more school grades in the same time. The poorest group furnishes the only serious cases of domestic infelicity and of financial worry.

It may be safe to infer from all these facts that the one group is superior to the other because it is composed, on the whole, of better all-around men, and that motormen are not born, but are made of good substantial human material.

The mental tests were used to discover if general intelligence bore any relation to success as a motorman. The amount of schooling was not the question at point, but, rather, natural ability, native capacity, the power to grasp new situations.

The tests employed are well standardized and would fit in conveniently as a part of the routine procedure in the employment department. They can be given simultaneously to a group as well as to a single individual. The men with little schooling were given only tests in which their lack of education was not a handicap.

Table I shows the comparative standings of all the men who took the tests. It will be seen that Motorman 139 achieved 98 per cent, which means that in general mental grasp and ability to learn he stands higher than 97 per cent of the adult population of this city. The standings of the best group range from 98 to 26, the latter standing being made by Motorman 124.

It is important to note that fourteen of the poorest group (or more than half) fell below the lowest man of the best group. In other words, fourteen of the twenty-three in the poorest group tested ranged from 23 per cent

TABLE I—INTELLIGENCE RATINGS

Best				Poorest		
B	C	D	A	B	C	D
139	37	69	98	...	...	...
119	30	72	94	...	...	...
130	32	70	93	...	...	...
.	.	.	83	103	(39)	67
112	32	67	80	144	24	(66)
117	23	72	79	...	...	...
122	28	68	79	...	...	...
145	(39)	69	78	...	.	.
...	..	..	76	125	(51)	67
143	36	68	75	...	...	...
107	29	69	66	...	...	...
1	..	.	65	140	37	69
116	26	70	64	...	..	...
...	..	..	53	131	36	(64)
...	..	..	52	109	(39)	69
146	22	71	50	...	...	...
129	34	71	50	...	...	...
127	23	69	49	..	.	..
...	..	..	40	138	27	(66)
...	..	.	36	136	(38)	71
132	34	68	35	...	...	...
105	24	68	34	...	..	...
133	(48)	69	33	141	24	74
108	34	68	33	.	.	.
106	33	68	30	.	.	.
120	27	74	29	.	.	.
135	23	69	29	.	.	.
113	35	70	28	.	.	.
101	25	70	27	.	.	..
137	22	69	27	...	..	.
124	26	69	26	.	..	...
...	..	..	23	110	43	(65)
...	..	..	21	104	(46)	(65)
...	..	..	21	114	34	67
...	..	..	20	142	(40)	72
...	..	..	19	134	36	70
...	..	..	18	126	23	70
...	..	..	17	115	36	(64)
...	..	..	16	147	(40)	71
...	..	..	15	111	(42)	70
...	..	..	12	118	27	(66)
...	..	..	11	128	34	68
...	..	..	8	123	(42)	(66)
...	..	..	8	121	37	(65)
...	..	..	4	102	29	70
...	..	..	..	...	...	...

Legend:

A—Intelligence percentage.
B—Key number of motorman.
C—Age at beginning (breaking in).
D—Height in inches.

The group of best are at the left of Column A, while the group of poorest are at the right.

The figures in parentheses indicate disqualification by the following assumed standards:

1. Not over 37 years at beginning.
2. Not less than 67 inches tall.

All below the twenty-fifth intelligence per cent are also disqualified.

to 4 per cent, and not one of the best group fell so low.

It would seem advisable to inquire further into the cases of motormen from the poorest group who did as well on the tests as did the best group. If we may apply the findings from the analysis of the application blanks and take as a maximum age thirty-seven years, and as a minimum height 67 in., all of these exceptional cases may be explained.

Motorman 103 was too old, thirty-nine, when he broke in, and had been trained in newspaper work, which is quite different from his present occupation. Besides, he is worried over financial losses in Mexico.

Motorman 144 has been in the service less than a year and his division superintendent states that he may be expected to develop into a good man. It is to be noted that he is only 66 in. tall.

Motorman 125 was fifty-one years old when he broke in.

Motorman 140 has domestic troubles in that his wife deserted him, leaving him the care of four children.

Motorman 131 has had less than a year of experience and he is only 64 in. tall, or 3 in. less than the assumed minimum.

Motorman 109 broke in at the age of thirty-nine; however, his division superintendent classes him in the middle one-third of his men, and not as one of the poorest as he was originally supposed to be classed.

Motorman 138 has the financial worries induced by an extravagant wife. In addition, he is only 66 in. tall.

Motorman 136 was formerly a salesman. He drinks and is classed as being one of the least contented of all the men. His division superintendent makes this comment: "Knows how, but is very obstinate." He was thirty-eight years old when he broke in.

Motorman 141 is an Irishman who is said to be independent and quarrelsome. He has to be "treated rough." He is ranked as being the least contented of the men studied in that division.

General intelligence can be gaged fairly well by means of tests, but there are other important qualities for which there are no quick, direct employment tests available. However, there is good reason to believe that, in general, desirable human qualities tend to go together; in fact, careful research in the national army resulted in the conclusion that the best single criterion in classifying men for general value was general intelligence as measured by tests, and this study indicates that the same rule holds true for motormen.

QUALITIES COMPARED

In order to determine how well standing in intelligence corresponds (correlates) with standing in other desirable traits and also with standing in the performance of duties, each division superintendent was asked to rank his men (those tested) in each of the traits and in each of the duties. These rankings were correlated with the rankings in intelligence and Table II and Table III were prepared from the results.

TABLE II—SHOWING THE CORRELATION BETWEEN RANKING IN GENERAL INTELLIGENCE (AS TESTED) AND RANKING IN THE POSSESSION OF DESIRABLE TRAITS

Division Superintendent	Correlation Coefficients													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
DS-A........	36	09	19	19	27	19	14	26	07	02	25	31	04	27
DS-B........	19	07	21	31	05	31	31	31	50	16	21	22	02	03
DS-C........	30	05	59	15	52	32	27	32	02	20	59	30	22	34
DS-D........	43	51	14	10	51	60	63	32	23	51	60	56	49	51
DS-E........	79	94	85	69	77	67	81	77	78	67	77	81	78	77

DESIRABLE TRAITS

A. Does not try to beat the other fellow to the corner, not spectacular, does not show off.
B. Courteous, polite.
C. Not talkative, laconic, reserved, reticent.
D. Courageous, sticks to his post in danger, brave.
E. Punctual, prompt, not tardy.
F. Decides quickly, quick to react, ready to act.
G. Proficient, skillful, adept, expert.
H. Contented, satisfied, cheerful, happy.
I. Amenable to discipline, willing, adaptable, conforms to schedule, responsive to suggestion.
J. Cool, keeps his head, not excitable, deliberate, even-tempered, self-confident.
K. Alert, watchful, vigilant, keeps his eyes open.
L. Careful, does not take chances, cautious, prudent.
M. Loyal, faithful, devotion to company, can be counted on.
N. Average of all ranks.

TABLE III—SHOWING THE CORRELATION BETWEEN RANKING IN GENERAL INTELLIGENCE (AS TESTED) AND RANKING IN THE PERFORMANCE OF DUTIES

Division Superintendent	Correlation Coefficients											
	A	B	C	D	E	F	G	H	I	J	K	L
DS-A....................	−08	16	20	−02	19	29	16	15	03	23	−17	34
DS-B....................	83	03	10	27	25	19	05	01	19	14	13	17
DS-C....................	54	05	20	18	61	52	07	09	34	34	34	18
DS-D....................	77	47	58	55	13	51	54	61	66	57	57	60
DS-E....................	67	75	89	74	70	75	75	75	81	59	59	72

PERFORMANCE OF DUTIES

A. Fills out required reports intelligently.
B. Treats passengers courteously.
C. Uses current economically.
D. Learns his duties quickly.
E. Refrains from unnecessary conversation.
F. Reports for duty promptly. (Does not oversleep.)
G. Operates his car smoothly.
H. Uses his equipment properly and keeps it in good order.
I. Keeps to schedule.
J. Avoids accidents.
K. Keeps car under control.
L. Average of all ranks.

TABLE IV—SHOWING EXTENT TO WHICH RATINGS BY DIVISION SUPERINTENDENTS WERE INFLUENCED BY MOTORMEN'S LENGTH OF EXPERIENCE

Division Superintendent Correlation of:		DS-A	DS-B	DS-C	DS-D	DS-E
Desirable traits with length of experience....................	r 12	.82	.91	.70	.50	.73
Desirable traits with intelligence....................	r 13	.27	.03	.34	.51	.77
Length of experience, with intelligence....................	r 23	−.04	.04	.35	.01	.74
Desirable traits with intelligence (after eliminating influence of length of experience)....................	r 13.2	.53	.01	.15	.59	.50
Desirable traits with length of experience (after eliminating influence of intelligence)....................	r 12.3	.86	.91	.66	.58	.37

A careful study of Table II will reveal the fact that there is a positive correlation between intelligence and other traits desirable in a motorman; or, in other words, the brighter a man is (as shown by tests) the more likely it is that he stands high in other traits—even such traits as contentment and loyalty.

A study of Table III bears out the conclusion that general intelligence and the performance of duties have a positive correlation. Column J of this table indicates that intelligence (as tested) is a positive factor in the very important duty of avoiding accidents.

Although the division superintendents were asked to rank these motormen in inherent traits, i.e., inborn traits which can be only slightly modified, if at all, by discipline or education, it is quite apparent in Table IV that the ranking was very considerably biased by length of experience as motorman. Such biases are an actual hindrance in the investigation, for what the employment department needs are facts which will help in analyzing the inexperienced applicant.

Fortunately, however, it was possible to use the method of partial correlation to determine the correlation of intelligence with traits after the bias of experience had been eliminated. This method of partial correlation threw considerable light on the rating skill of each division superintendent.

Superintendent DS-A appears to have been very considerably influenced by the experience of the men he rated. After the influence of this factor is eliminated the correlation between intelligence and traits becomes quite marked (.53). Only one other man is more greatly influenced by length of experience.

It is almost certain that Superintendent DS-B depended practically entirely upon the length of experience of the men he ranked. Since it so happened that no relation existed between experience and intelligence, the elimination of the former factor could have no possible effect upon the correlation of the latter with traits. Consequently, no weight whatever can be attached to the intelligence correlation figures for this superintendent. The validity of the statements in this paragraph are borne out by the admission of the superintendent himself.

Superintendent DS-C was less influenced by length of experience and consequently a higher correlation is found for intelligence.

Superintendent DS-D is still less influenced by experience and as might be expected there is a high correlation between intelligence and desirable traits.

Superintendent DS-E is influenced by experience least of all as his bottom figure in Table IV shows. For his division, also, there is a high correlation for intelligence.

It has been assumed by some persons

that the more intelligent a motorman is the less satisfied he will be with his job, and the sooner he will leave the service of the company. To investigate the correctness of this assumption a study was made of the relation between the intelligence standing and length of experience; the result showed practically no correlation whatever. In other words, if the twenty-four best men studied are typical of all best men, the conclusion is warranted that the more intelligent are just as likely to remain with the job as the less intelligent. If further study bears out this conclusion, one of the principal objections to hiring the brighter men will have been eliminated.

Another assumption, apparently ill-founded, has been made that the more intelligent men are less likely to be loyal to the company in times of crises. Those who oppose this assumption say, on the contrary, that the less intelligent are more readily misled by agitators, and that the more intelligent cannot be stampeded, that they think for themselves. Certainly the figures of this study (Table II, Column M) give support to those who believe the more intelligent men are more to be depended upon in times of stress.

CHIEF RESULTS WITH TESTS

To summarize the principal indications so far revealed in the use of mental tests the following points may be made:

1. No applicant should be hired who falls below 25 per cent in the intelligence tests.
2. There is a reasonably high correlation between general intelligence and the traits and duties which are important for motormen.
3. Among the best motormen there is no greater tendency for the most intelligent men to leave the service than for the less intelligent.

Report Giving Answers to Some Pertinent Questions

This report, submitted June 9, 1921, related particularly to answers to the following questions:

1. When were the so-called "poorest" men hired?
2. Do dependents increase length of service and reduce the labor turnover?
3. What causes some men to be unusually slow to learn to operate the cars?

WHEN WERE POOREST MEN HIRED?

Undoubtedly there are times of crisis when an employment department cannot pick and choose men, but must take what it can get, as in times of a strike or a war—times when men are scarce and when the job of motorman is not so attractive as it might otherwise be. With these points in mind, a table was made up to show when each of the twenty-three poorest men (as listed in the earlier report was hired. Study of this table shows that the first of these so-called poorest men was hired April 17, 1911, while the last one of this list was hired May 25, 1920. The figures indicate that the 1917 strike and the 1918 war drafts did apparently necessitate the employment of the poorer material, but these two crises do not explain the employment of all of this group. It also shows that of the twenty-three men considered, all but one would have been rejected under at least one of the three assumed standards already mentioned, i.e., the minimum intelligence percentage of 26, the minimum height of 67 in. and the maximum age of thirty-seven years.

The use of general intelligence tests would certainly enable the inspector of applicants to know more exactly than has been possible heretofore the caliber of the men he interviewed, even though men were scarce, and just as soon as a crisis passed he could raise the standard for applicants and thus shut out the less able men.

DEPENDENTS AND LENGTH OF SERVICE

It was pointed out in the prior report that the number of dependents possessed by a motorman bore no apparent relation to his skill and general value to the company. The research committee wished to know, however, if the number of dependents had an effect upon labor turnover, i.e., if a man with dependents was more or less prone to quit his job on account of that fact. To throw some light on this topic, several tables were prepared by the committee. These tables contain a summary of the most important facts which have a bearing on the problem and indicate that among the best motormen the more dependents a motorman has the shorter the length of time he is likely to remain in the service of the company. If a more extended study corroborated these figures it would certainly upset the preconceived ideas of many employment managers, at least so far as concerns a situation such as this one.

A possible explanation of these facts presents itself in the following line of reasoning: The best motormen are capable men and could succeed in other lines of work. When they have no dependents they can get along very well on such pay as they receive, but if they have several dependents it becomes harder to make both ends meet and they leave the service of the company for other work where there is no standard rate of pay for all men alike and where there seems to be a better avenue for economic advancement.

On the other hand the table also shows that so far as the so-called poorest men are concerned, the more dependents a man has the longer he is likely to remain in the service of the company. To explain such facts as these, the following argument may be advanced: The poorest motormen are, as a rule, relatively incompetent men and would not succeed well at most other types of work. Probably they have already learned of their own incompetence through the hard knocks of experience and are, when they have dependents, quite loath to give up this job in order to find a more lucrative one. If the men considered in these tests are a fair sampling as regards dependents and labor turnover, the inspector of applicants would be justified in showing preference to applicants without dependents, for it is only among the poorest men that dependents seem to increase the length of service, while with the best motormen the fewer the dependents, the less the turnover. At any rate, these data certainly would not warrant the inspector of applicants in giving preference to applicants with dependents.

SLOW LEARNERS

The research committee was desirous of learning why some of the motormen took longer than the customary seven-day period to "break in." Accordingly, twenty-one motormen who had taken twelve days or longer to learn the duties of motorman were interviewed and tested. From the results of the interviews and the general intelligence tests Table V was compiled and shows that if the employment department could have used the assumed standards just enumerated, only five of the twenty-one slow learners would have been hired; the other sixteen would have been rejected. If the inspector had rejected all applicants below 67 in. he would have eliminated five of the twenty-one slow learners. If all applicants older than thirty-seven years had been rejected seven of these slow learners, or one-third, would have been eliminated, and it appears that the age at "breaking in" has a really important bearing upon the facility with which a student motorman learns his duties. If the employment department could have rejected all applicants falling below the twenty-sixth intelligence percentage, twelve of these twenty-one men, or four-sevenths, would have been eliminated. It seems that men who make low scores in these tests are slow to learn the duties of motormen, and since the cost of training is an item of no little importance, it might be worth while to measure the general intelligence of all applicants considered.

TABLE V—MOTORMEN TAKING TWELVE DAYS OR MORE TO BREAK IN

Key Number of Motorman	Intelligence Percentage	Age When Hired	Height
205	61	(53)	71
101	59	24	70
216	53	37	69
218	40	37	71
204	33	37	67
217	33	(39)	(63)
219	30	32	(65)
215	29	24	69
202	27	(51)	69
104	(21)	(45)	(65)
201	(20)	(43)	67
214	(20)	37	(65)
213	(20)	32	(66)
206	(19)	29	68
211	(17)	35	69
207	(16)	27	68
208	(15)	(41)	68
210	(13)	35	67
209	(9)	(42)	67
212	(9)	33	69
203	(5)	(40)	68

Note—Parenthesized figures indicate ground for rejection under the assumed standards of Report No. 6, i.e., the minimum intelligence percentage being 26, the minimum height being 67 in., and the maximum age being thirty-seven years.

Motorman No. 203 was forty years old when he "broke in" with this company. He was about thirty-four years when he "broke in" in New York City.

Motorman No. 205 stands first in this list as regards intelligence but he was too old when he broke in, fifty-three years, hence his inaptitude at "breaking in."

No. 101 stands second in general intelligence and eventually developed into one of the best men in his division (being listed among the best in the earlier report. No reason is apparent for his slowness to "break in"; however, the use of the motor co-ordination apparatus may bring to light the real cause. The important fact in this case is that he stood relatively high in the intelligence tests and that finally he got to be a very competent motorman.

No. 216 stood third in the mental tests (43d per cent), but he was thirty-seven years old when he "broke in"; his age may have made him slow in learning. He had been a farmer and may have been unfamiliar with traffic conditions.

No. 218 was fourth in the test standings (40th per cent), but was thirty-seven years old when he "broke in."

No. 204 was thirty-seven years old when he "broke in" and had been a farmer, possibly unfamiliar with traffic conditions.

No. 217 was too old (thirty-nine years) when he "broke in" and was also too short (only 63 in.).

No. 219 was only 65 in. tall. He had been a farm hand and a sailor; in neither of these occupations did he have a good opportunity to learn traffic conditions.

No. 215 was a hardwood floor layer and had previously worked on the farm. He stood at the twenty-ninth intelligence per cent and broke in at twenty-four years. There is no apparent outstanding cause for his unusual slowness at learning his duties.

No. 202 was fifty-one years old when he "broke in." This explanation would seem sufficient to explain his slowness in learning his duties.

The other twelve slow learners are too low in general intelligence, as they range from the twenty-first per cent to the fifth per cent. Five of these twelve were also too old at the time at which they "broke in."

No. 203 was the lowest in general intelligence with a standing at the fifth per cent. The most interesting fact concerning him was that six years prior to his "breaking in" with this company he had "broken in" in New York City and had worked two years there. Only his very low standing in intelligence would explain his inability to learn his duties in operating the cars of this company in a reasonable time.

It is, of course, important to know whether the slow learners gain skill quickly enough to avoid accidents immediately after the "breaking in" period is over and whether they become within a reasonable time as competent as the men who take less time to "break in." If the slow learners do not develop average skill within reasonable time, they are certainly not to be preferred.

TABLE VI—TEST SCORES OF MOTORMAN APPLICANTS ARRANGED IN ORDER OF SIZE OF TEST SCORE

Motormen	Test Score	Motormen	Test Score
(1)	163	(15)	x 117
(2)	x 157	(16)	x 114
(3)	x 134	(17)	113
(4)	x 130	(18)	x 113
(5)	130	(19)	x 112
(6)	x 125	(20)	x 110
(7)	124	(21)	x 108
(8)	123	(22)	x 106
(9)	x 122	(23)	x 105
(10)	121	(24)	x 105
(11)	120	(25)	x 105
(12)	x 120	(26)	x 105
(13)	x 119	(27)	x 104
(14)	118	(28)	x 102
Motormen	**Test Score**	**Motormen**	**Test Score**
(29)	102	(43)	x 83
(30)	x 100	(44)	83
(31)	100	(45)	82
(32)	100	(46)	x 81
(33)	99	(47)	x 80
(34)	96	(48)	80
(35)	96	(49)	79
(36)	92	(50)	x 74
(37)	x 91	(51)	74
(38)	91	(52)	x 74
(39)	x 89	(53)	x 72
(40)	x 87	(54)	63
(41)	x 86	(55)	61
(42)	[illegible]	(56)	x 56

Median (Average) Score—102.

Note—All motormen marked with an (x) have left the employ of the company. It will be noted that twenty (20) motormen leaving were above the median (average) score of 102 points, while twelve (12) motormen were below the median (average) score. This indicates that, under existing conditions, the brighter motormen showed a greater tendency to leave the service.

TABLE VII—TEST SCORES OF CONDUCTOR APPLICANTS ARRANGED IN THE ORDER OF SIZE OF TEST SCORE

Conductors	Test Score	Conductors	Test Score
(1)	156	(11)	124
(2)	148	(12)	122
(3)	x 143	(13)	121
(4)	139	(14)	x 120
(5)	x 132	(15)	119
(6)	129	(16)	118
(7)	126	(17)	115
(8)	126	(18)	112
(9)	125	(19)	104
(10)	125		
Conductors	**Test Score**	**Conductors**	**Test Score**
(20)	x 103	(29)	88
(21)	102	(30)	x 86
(22)	100	(31)	x 86
(23)	98	(32)	83
(24)	94	(33)	x 80
(25)	92	(34)	76
(26)	92	(35)	x 70
(27)	x 89	(36)	x 69
(28)	x 88	(37)	65

Median (Average) Score—104

Note—All conductors marked with an (x) have left the service of the company. It will be noted that three (3) conductors above the median (average) score of 104 points left, while eight (8) below the median (average) score left, this indicating that the brighter conductors have a tendency to remain longer in the service than those who do not rate so high.

In comparing this table with Table VI, it will be noted that the two groups of applicants (conductors and motormen) made about the same test scores, with approximately the same average score, indicating that equally bright men are attracted to each of the two platform jobs.

Report on Intelligence Tests on New Employees

The three tables (VI, VII and VIII) on this page give the most outstanding features of the study of the platform applicants who were employed and tested in the latter half of 1921. The intelligence test used was so devised as to be practically self-explanatory. It offered no advantage to those who had had the better schooling. This test could be given by any competent employment manager with equally accurate results.

A comparison was also made of the test scores of ninety men with experience of twelve months or less. It was found that the eighteen with the greatest length of service made an average test score of 102 points. The eighteen men who stood next in length of service made an average of 106 points. The next eighteen men had an average of 104 points, the next eighteen men an average of 109½ points, while the eighteen men who stayed the shortest length of time made an average score of 100 points. Apparently, when platform men are so grouped, test scores seem to have very little, if any, relation to length of service under existing conditions.

TABLE VIII—SHOWING THE AVERAGE TEST SCORES OF PLATFORM MEN IN RELATION TO THE RATINGS GIVEN FOR GENERAL VALUE TO THE COMPANY

Ratings	Men Still in Service	Men Who Have Left Service
Motormen rated "above average"	108 plus	103 minus
Motormen rated "average"	101	113½
Motormen rated "below average"	84 minus	107 minus
Conductors rated "above average"	118 minus	132 minus
Conductors rated "average"	98 minus	80
Conductors rated "below average"	93½	83 plus

Although the number of platform men studied is too small to draw any final conclusions, it seems that there is a positive relation between test score and value to the company among those who stick to the job. However, the relation is not close.

The relationship between the test scores of those who left the service and their general value to the company is not clear, especially in the case of motormen. The ratings were given to the men by their respective division superintendents in September, 1922, which allowed, on the average, about eleven months' service with the company before the platform man was rated.

Appendix No. 2

Appendix No. 2 contains some of the detailed discussion of the report of the committee on personnel and training of transportation department employees.* It does not include a discussion of the training of one-man car operators because there are no one-man cars in San Francisco. Neither is there a discussion of standard forms for physical examination because at the present time the Market Street Railway has not assembled sufficient research data on which to offer any suggestions of value. The general criticisms of the suggested psychological tests follow:

1. One of the essential requirements for a psychological test is "standard conditions" whereby the same results would be obtained by other persons in other places. One of these "standard conditions" is a set of standard instructions so that all persons using the test will give it in the same way. It is unfortunate that the tests included in the committee report are not accompanied by instructions for their use and application. To illustrate this point, consider the fourteenth item in the first test of Appendix A, i.e., if two pencils cost 5 cents, how many may be pur-

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*See *Electric Railway Journal* for Oct. 7, pages 589-592.

chased for 50 cents. This item comes in the Stanford-Binet test for fourteen-year-old children. It is supposed to be solved mentally in one minute or less. If the person tested were to use pencil and paper it would make the problem very much easier, or if a longer time were allowed to solve the problem. It is only by adhering to standard instructions that comparable results are to be obtained.

2. A test of general intelligence should be so devised that it is not a test of school training. It should give all applicants an equal chance, so far as that is possible, for general intelligence is probably innate and not acquired, and any intelligence which would give undue weight to the results of school training would, therefore, not really achieve its purpose. In Appendix B the "test to show that a man can follow instructions" (which is a phase of general intelligence) would apparently not be fair to the man of little school training. It is quite possible that an intelligent man of poor schooling might get confused by this complicated test. How many men know Independence Day is the Fourth of July?

3. It is very desirable to devise tests which can be scored objectively, i.e., the same answers will be given the same credit no matter who examines the papers. Many of the test items suggested in the report would be rejected under this criterion. An illustration of this defect occurs in the seventh item of the first test in Appendix A: "What is your idea of the value of such qualities in a conductor?" It would be very difficult to arrive at a standard method of evaluating the answers, yet we must if we are to pool or exchange results which shall be comparable.

4. The tests should be easy to score and quick to score. In the army the tests were drawn up in such a manner that stencils could be used for scoring the answers, thus rendering the work speedy, mechanical and accurate. The "common sense" test or "test of judgment" Appendix B (see last column page 591*) would satisfy this criterion, but most of the other tests would not.

5. It is desirable to employ tests which are practically self-explanatory. The employment manager is usually a busy man and he simply cannot spend a long time testing each applicant personally. It takes usually an hour or more to give the Binet tests to one person, and these tests are similar to the Binet tests in many respects. It is therefore impractical to attempt to give many of the committee report tests to the applicants.

6. A good intelligence test will be a fair measure of such so-called special abilities, such as judgment, ability to learn, ability to follow instructions and directions, memory, ability to make selective response, ability to maintain attention, ability to give a sensible account of some occurrence involving power of observation, etc. There is good evidence to believe that these special abilities are all merely phases of the one thing—general intelligence, and that a test of the latter tests the other abilities also, and if such is the case, it would seem more economical of time and effort to confine attention to testing general intelligence alone.

CRITICISMS OF SPECIFIC PORTIONS OF THE REPORT

Appendix A. Tests for motormen: It is not at all apparent that the tests to "indicate quickness of motor reaction to special sense perception, especially sight and hearing" (foot of page 589, issue of Oct. 7*) do actually test the same mental functions that are used in the performance of motorman duties. The test "to indicate judgment of speed" (page 590*) could probably be passed by almost any one of good education regardless of his ability to judge speed while operating a car.

Appendix B. Form 1. Job Specification. (Second column, page 590*): It is an excellent plan to place before the employment manager in definite form a job specification sheet. Such a sheet would aid in focussing attention upon the requirements of the job to be filled. It tends to keep the interviewer from overlooking any of the requirements. Job specification sheets are more necessary if the employment manager must hire for many different types of jobs.

Form 4. Data Sheet. To be filled by employment agent. (Page 590-1*): This sheet makes it possible for the interviewer to record his judgment of the applicant at the time of interview. It also tends to keep the interviewer from overlooking traits, desirable or undesirable. The items on this sheet could be changed from time to time as careful study revealed some items as being important and others as unimportant.

Form 5. Data Sheet. To be sent to reference. (Page 591*): It is highly desirable to get the references of the applicant to respond with as detailed and specific information as possible. Apparently Form 5 was designed with this purpose in mind. However, it is doubtful if many of the references would reply, for the sheet requires careful study, thought and analysis.

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*References are to *Electric Railway Journal*, issue of Oct. 7.

A. I. E. E. Discusses Cars and Buses

Following a Paper on This Subject by J. C. Thirlwall, Various Speakers Consider Relative Advantages

AT A MEETING of the New York section of the American Institute of Electrical Engineers, held in New York on the evening of Sept. 20, the topic considered was the relative merits of trolley cars, trackless trolley buses and gas motor buses. There was a large audience, and J. C. Thirlwall, railway engineering department General Electric Company, was the principal speaker of the evening. Calvert Townley, chairman of the New York section, presided.

MR. THIRLWALL'S ADDRESS

Mr. Thirlwall's address was largely a comparison of costs of installation and operation of car lines, trackless trolley lines, and bus lines for city service, and was accompanied by statistics which had been presented by him in a paper read in March before the engineering societies of Cincinnati and Indianapolis. These figures were published in *Bus Transportation* for September. Mr. Thirlwall said that so long as municipalities are willing to offer the use of smooth pavements free of charge to all commercial vehicles and compel the railway company to pay not only for its own tracks but for much of the paving as well, a considerable bonus is offered to users of buses. Nevertheless, except for relatively short hauls on selected routes where no attempt is made by a bus company to provide the extra equipment demanded by rush-hour traffic, a railway could show materially better financial returns on its entire investment and be much more successful in handling mass transportation than a bus line.

One reason for this is that the smallest car yet developed, the Birney safety car, will carry 50 per cent more passengers than the largest single-deck bus yet developed, so that to carry an equal number of people would require 50 per cent more buses than Birney cars. Mr. Thirlwall said he omitted in this comparison consideration of double-deck buses, like those operated on Fifth Avenue in New York and on Michigan Avenue in Chicago, because those lines are largely patronized by pleasure riders, and the double-deck bus is not suitable for business transportation. Trolley cars could also have a double deck, he said, but experience has shown that for service in this country they slowed down the schedules too much to be desirable.

The trolley bus is suitable particularly for extensions to a trolley line where the traffic is not sufficient to warrant the installation of rails, also on crosstown lines.

Mr. Thirlwall presented the accompanying table of operating expenses and fixed charges for a route 4½ miles long with street cars making the round trip, including layovers, in sixty minutes. On a fifteen-minute headway four cars would be required, on a ten-minute headway six cars, on a five-minute headway twelve cars. One reason for the high first cost of buses is that during the seven hours of heaviest riding 50 per cent more buses than cars would be required to give equal passenger capacity and carry the people. The accompanying table shows comparative figures of the three systems.

In summing up this comparison, the speaker said that for all routes extending into the business center of large or medium-sized cities the rail cars offer the most efficient and most economical form of transportation; for

suburban, feeder, and crosstown service, the trolley bus will be the most suitable vehicle, and that only special conditions that prevent the erection of an overhead line would justify the use of gasoline buses inside the city limits.

COMPARATIVE COSTS PER ROUTE-MILE OPERATED

Long Headway Twelve-Fifteen Minutes	Rail Cars	Trolley Bus	Motor Bus
Annual mileage......	52,500	63,000	63,000
Total investment.....	$61,000	$23,800	$14,000
Fixed charges, per cent	13	13.5	16.7
Annual operating cost	$9,440	$12,500	$17,600
Annual fixed charges..	7,960	3,220	2,340
Total annual cost...	$17,400	$15,720	$19,940
Medium Headway, Eight-Ten Minutes			
Annual mileage.......	79,000	94,000	94,000
Total investment.....	$72,000	$33,000	$21,000
Annual operating cost	14,160	18,600	26,200
Annual fixed charges..	9,360	4,450	3,500
Total annual cost...	$23,520	$23,050	$29,700
Short Headway, Four-Six Minutes			
Annual mileage.......	157,000	188,000	188,000
Total investment.....	$123.500	$60,500	$42,000
Annual operating cost.	28,300	37,000	52,500
Annual fixed charges..	16,050	8,200	7,000
Total annual cost...	$44,350	$45,200	$59,500

In conclusion Mr. Thirlwall said that the bus proponents have made many claims as to their ability to handle all of the traffic of a community, but where the buses have had an opportunity to do so in any city of considerable size, they have failed. This has been true in Bridgeport, Des Moines, Muskegon, Toledo and Saginaw. In all of these places, except Saginaw, after some weeks' trial with the bus as the only means of transportation, the community found it necessary to ask the electric railway to resume service. Even in Saginaw there is a very strong feeling, especially among the retail merchants who have experienced a loss of sales, to ask the electric railway line to begin its service again.

DISCUSSION ON PAPER

At the conclusion of Mr. Thirlwall's address, Chairman Townley said that it was expected that Commissioner Grover A. Whalen of the Department of Plant and Structures, New York, would be present. He was detained but sent a statement which was read by Commissioner Mills. It is given below:

"I cannot go along with the idea that rail transportation of passengers through city streets remains the most economical method of urban conveyance. This conclusion is contrary to the indications of our experience in the Department of Plant and Structures. I say 'indicated' advisedly, for I confess I am not ready to present conclusions. We have not yet had sufficient experience either with the gasoline bus or the trackless trolley car to set forth as demonstrated the greater economy that I believe will be effected in urban transportation by the development of these two methods of surface transportation.

"As to motor buses, the department is operating none. It is supervising the operation of privately-owned buses. It has no records of costs or receipts—but we have this fact, namely: These buses are operating at a comfortable profit at a 5-cent fare on lines abandoned by trolley companies as unprofitable. This is not a carefully figured demonstration of the lower cost of transportation by gasoline buses, but it is more eloquent and more convincing than mere figures. With this experience I am pardoned, I believe, in expecting that the Department of Plant and Structures will be able to carry passengers in buses more economically than they can be carried in cars running on rails.

"I notice that the argument for transportation by rail is based largely on the allegation that 50 per cent more vehicles will be required if buses are substituted for trolley cars. This was true, but it is not true now. The motor bus has grown. The vehicle designed by this department will carry thirty-three seated passengers and twenty-seven standing—a total of sixty. Buses of this type are now in successful operation. This bus has answered the economy claim of the trolley car.

"As to the operation of trackless trolley cars, I do most positively claim that this is the most economical method of passenger transportation along public highways. When our department went into the development of this system of transportation, I had the matter of costs calculated. It developed, on information available a year ago and at costs then prevailing, that the cost per mile of service, including all costs of interest, depreciation, power, maintenance and operation, figured as follows:

Gasoline bus, per car-mile......	29.55 cents
One-man trolley car, per car-mile	24.3 cents
Trackless trolley, per car-mile..	20.95 cents

"Going over the calculation recently, in the light of added facts and experience, I find that the average costs figure as follows:

Gasoline bus, per car-mile......	27.87 cents
One-man trolley car, per car-mile	21.60 cents
Trackless trolley, per car-mile..	18.66 cents

"These figures, it is to be noted, are based on existing conditions. Moreover, they are approximate, not final. Moreover, the trolley car has reached its lowest point on the scale of cost and is not likely to go lower. The gasoline bus and the trackless car, however, are in an early stage of development, and the trend of costs in these operations will be downward as the development proceeds. I feel I am warranted, therefore, in asserting that the Department of Plant and Structures has developed in the trackless trolley system a means of passenger transportation more economical than any yet conceived. I feel that I am warranted also in believing that, if the Legislature frees us from the bonds of injunctions, the Department of Plant and Structures will be able to maintain and operate motor bus lines at smaller cost per car-mile than any cars running on tracks.

"So much for the economy phase of the problem. As for efficiency—quick and dependable service in all sorts of adverse weather conditions, the trackless trolley system and the gasoline bus system both proved themselves superior to the rail lines in our experience on Staten Island when they operated without interruption on winter days when all track lines were tied up."

Edward A. Roberts, chief of transit bureau, New York Transit Commission, followed Commissioner Mills. He quoted from a report of the Transit Commission to the effect that this body sees a place for buses in the New York transportation scheme, there being sections where service is sorely needed and where it cannot well be furnished by railways. As a suggestion to start thinking along the line of trackless trolley development Mr. Roberts asked the question: "What is the matter with the trolley bus?" This question, he said, is inspired by the fact that in spite of the length of time during which the trackless trolley has been in use on a small scale, it is used on only one line in the United States today. As a possible answer he cited the hypothetical case of a rail line faced with a demand for extended service for which the prospective business was in doubt. The natural thing would be to try out the traffic possibilities by means of a motor bus or two, adding to the number as traffic developed. The investment would thus be small and the buses would have some value if the service proved unprofitable.

Assuming, however, that business develops as expected, the time comes when a trolley bus line might be feasible. This, however, would mean the scrapping of the motor buses and making a considerable investment for overhead construction and new vehicles, or still further adding gas buses until the point is reached where a rail line would be profitable. The chances favor the additional buses in this case.

In closing Mr. Roberts said that the results of Mr. Thirlwall's work in the introduction of the safety car gave promise for the trolley bus, and he for one would hesitate to say that there is not a future for it.

Charles R. Harte, New Haven, Conn., then said that he wanted to correct a possible misapprehension as to the reason for discontinuance of street railway service in Bridgeport. This was not a breakdown of the service but the action was taken by the management as a protest against unregulated and unjustified jitney competition. Mr. Harte reminded his audience also that while only one trackless trolley line is in operation in this country, there is one in Windsor, Ont., which seems to be satisfactory, and the Toronto Transportation Commission has a number of trolley buses in use.

Prof. Morton Arendt, Columbia University, said that a feature of the trackless trolley is in the permanency of route, as compared with the gasoline bus. The presence of the overhead gives confidence of continued service and encourages real estate development.

In his closure to the discussion, Mr. Thirlwall reinforced what Professor

Arendt said. This feature is noticeable along the line on Staten Island, New York City. In a new line soon to be commissioned in Baltimore, the value of the service to the new section of the city to be served is illustrated by the backing of the undertaking financially by those whose real estate will benefit. In this case the United Railways & Electric Company will install and operate the line. As to Mr. Roberts' question Mr. Thirlwall said that many cities are considering trolley buses, but complications of one kind and another, principally over franchises, have delayed action. In a number of places the buses have been tried out on a small scale with good results. After all, the new vehicle has been available but a year or so. The city authorities in New York are desirous of extending the trolley bus service on Staten Island, and its inauguration in other places is but a question of time.

Medical Defense of Litigated Claims*

This Article Offers Some Suggestions to Consider in Medical Examinations as Well as Advice to Trial Attorneys on Connecting Direct and Cross Examinations

BY JOHN LEEMING, M. D.
Medical Counsel Chicago Surface Lines

THERE are three classes of cases to be considered under this heading: First, cases of non-liability; second, cases of clear liability, and third, cases on the border line, in which the liability is in doubt. The class into which any particular case falls determines the importance of the medical defense. In the cases of clear liability there is no question in my mind but that a strong medical defense is of great assistance in enabling a jury to estimate the extent of the alleged injuries, whether the accident in question was the proximate cause and to assess the damages accordingly. In the border-line cases the medical defense is of the same importance if the defense fails to establish non-liability. In cases where the non-liability is clear it is obvious that the matter of extent of injuries is entirely irrelevant, but I have discovered that most experienced trial lawyers are loath to rely absolutely upon their ability to establish the non-liability issue for the simple reason that few cases are so clear cut. A case which appeared clearly to be a non-liability case may, after the plaintiff's evidence has been introduced, find more support for the plaintiff's theory than was anticipated, and, again, the witnesses that were relied upon by the defense to establish the non-liability may disappoint the trial attorney.

There are many surprises in the trial of lawsuits, and frequently in my experience it has occurred that an attorney who had not intended to introduce a medical defense has, when he found his case breaking badly, got in touch with me for the purpose of considering whether we could advantageously attack the plaintiff's theory that the conditions of disability were, as a medical proposition, due to the injuries.

Usually the trial attorneys with whom I have been associated have decided that in such a case it would be best to put on the medical defense with the hope of inducing the jury to render a more reasonable verdict than might otherwise be rendered. Of course, in cases of clear liability the medical defense must become the basis for defense, and in my experience there have been many cases of verdicts of not guilty where the jury, on medical evidence presented by the defense, rejected entirely the claim that the plaintiff suffered any injury whatever. Those were cases where the jury found that the alleged disability was not the result of injuries claimed to have been suffered from the accident.

My experience teaches me that when we go into court to defend a personal injury case there are two important things to be considered. The first is, who is to blame for the accident, and the second, is, how much is the individual hurt? The relative importance of these two lines of defense depends considerably upon the circumstances, and as to the first line of defense the medical adviser is of no aid. Speaking generally, I would say that if after complete investigation and a thorough conference with the crew and all available witnesses you are convinced that you can present a case to the jury of non-liability, the question of the extent of the injury is of minor importance.

While I do not advocate that a medical defense is essential in all personal injury cases, I do make the claim that in many cases it is of considerable value even in supposedly non-liability cases. It lays a valuable foundation in some cases for the argument of defendant's counsel "that this plaintiff is either mistaken or has deliberately lied in reference to the occurrence and he or she has grossly misrepresented the facts in regard to the effects of the injury." I believe that every personal injury case that goes to trial and which must be submitted to a jury should be treated as a fight and that the slogan of this association of safety first and safety always should be used in the defense of every damage suit that is brought into court. Our legal departments can be relied upon to furnish every available line of defense so far as liability is concerned, and I have the good fortune to be connected with a claim and law department that is forehanded in making thorough preparation for a possible medical defense.

PROGRAM IN MEDICAL DEFENSE

The first step in this preparation begins immediately after the accident occurs. This consists of an effort to obtain reliable information in detail as to the character of the occurrence, the immediate conduct of the injured individual as to whether conscious or unconscious, any bleeding from eyes, ears, nose, mouth or other parts, method of leaving scene of accident, whether the journey was continued, whether the individual walked, what assistance in reaching home, etc., what medical attention was rendered and how soon, the name of the attending physician, etc., an early interview with the attending physician, preferably by a medical man to obtain a statement as to the character and extent of the injuries (in writing if possible), an effort to learn whether the attending physician is fair and friendly and an endeavor, where desirable, to arrange for a consultation and examination by a company physician. If the examination is refused, the fact is noted in the file, as to who makes the refusal, whether the patient, the patient's relatives, the attending physician or the attorney if one has already been engaged.

An early medical examination is often of great value and by using diplomacy this examination can be obtained in the majority of cases. The earlier it can be made the better, and it is highly important that it should be made by a competent medical man and arrangements made for later consultations and examinations if the case requires them.

If it is a hospital case, the same general procedure should be followed, but in addition copies should be obtained of the hospital records, including the examining room diagnosis and later the diagnosis and treatment of the attending physician, duration in the hospital and condition of the patient when discharged. Valuable information is often obtained from the hospital record as to prior condition, character of symptoms, X-ray findings, etc., which may be difficult to procure later for various reasons.

Where an examination is to be made, it becomes very important to choose the right kind of doctor for the particular examination. If it is a surgical case, do not send a gynæcologist to make the examination; if it is a gynæcologist case, do not send a specialist on internal medicine, but adapt your examiner as nearly as possible to the type of injury involved. In any case, it is important to select a medical man who will obtain a complete history—not only of the accident in question, but of previous injury and disease, the medical attendance on such prior conditions, the various medical men who have treated the patient before the date of this accident, any hospital experience ever had, a complete history of the accident in question and an accurate statement of all objective symptoms present without any effort to minimize or to magnify them (these objective symptoms can be testified to in court). The doctor should also obtain as fully as possible a history of the subjective symptoms in the case, noting them on a separate sheet and not in the body of his report. (These symptoms he will not be required to testify to in court because they are subjective in character and may therefore be self-serving statements.)

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*Abstract of paper presented at the annual convention of the American Electric Railway Claims Association, Chicago, Ill., Oct. 2-5, 1922.

You will ask me, "What is the value of this list of subjective symptoms?" The answer is, they would very often indicate the type of individual you are dealing with. The very story of complaint may stamp the patient, especially if a woman, as a confirmed neurasthenic, and such knowledge is often extremely valuable, where there is a proper basis in the evidence, on the cross-examination of plaintiff's expert medical witnesses. And right here may I be permitted to offer a word of caution to our cross-examiner. If there are any lawyers present, it may be considered by them as presumptuous on my part, but at last year's meeting before this section a certain lawyer did not hesitate to speak his mind frankly and freely in condemning doctors and medical testimony generally from A to Z, so that I am sure that I will be pardoned if I offer a moderate suggestion to the members of the legal profession. My suggestion is that much damage has often been done to the defendant's case by improper cross-examination of medical witnesses. Some lawyers seem to be obsessed with the idea that to do their duty to their client it is necessary to go over every medical question that has been testified to on direct examination and make an effort to break the doctor down on cross-examination. Some lawyers do this for the purpose of showing their medical, surgical or anatomical knowledge. My observation leads me to the firm conviction that in the great majority of cases this method does more harm than good. In my lectures to law students, I give them this rule: In cross-examining an adverse medical witness, never ask him a question to which his answer can possibly hurt your case, and only ask such medical witness questions to which his answers might possibly help you, but cannot hurt you. Law students ask the question, "Can this be done?" Some of you gentlemen here may ask the same question. I answer that it can be done. Before telling you how it can be done, I will say further than it is a safe rule on disputed medical questions to prove your theory and your contention by your own medical witnesses rather than take a chance of dragging it out of an unwilling adverse witness. Take an assumed list of subjective symptoms, such for instance as your medical examiner may have obtained at the time of his examination of the patient. Let us assume that these symptoms are headache, backache, general nervousness, sleeplessness, poor appetite, very irritable, tingling sensation in the extremities, sweating of the hands and feet, twitching of the limbs, etc. The injured woman will almost invariably testify that she was perfectly well prior to the accident and never had any of these symptoms before, but that they have been continuous every since she was hurt. The attending physician will probably have testified that his patient complained of all of these symptoms ever since she was hurt. One or two expert witnesses will testify hypothetically that the accident in question was competent and sufficient to cause or bring about the symptoms described. Now how are you going to cross-examine this attending physician and how are you going to cross-examine the medical expert for the plaintiff?

MEDICAL CROSS-EXAMINATION

I will offer some general suggestions in reference to a case of this type:

Q. "Doctor, in your extensive experience as a medical man, have you ever seen a case which presented a similar group of subjective symptoms as those given to you in the hypothetical question in an individual who had never been injured?" (Yes.)

Q. "You have made a diagnosis of neurasthenia from the clinical picture presented. Have you ever encountered a similar condition in any of your patients who gave no history of injury?" (Yes.)

Q. Tell the jury what other causes than injury might be competent to produce such a condition.

Q. How about uterine displacement as a cause?

Q. Has it been your experience that an enlarged and congested uterus tipped backward and pressing against the sacrum is a sufficient cause for backache, headache and other reflex nervous phenomena?

Q. Such pelvic conditions and many others frequently occur, do they not, as a result of confinement?

(If no pelvic examination has been made.) *Q.* Do you know whether the hypothetical woman described to you was suffering from a laceration of the cervix or perineum—or a prolapse of the uterus or ovary—or whether she had any form of uterine displacement or disease?

Q. I presume you have seen a great variety of nervous phenomena resulting in women from disturbances of this character, have you not? (A yes or no will be equally valuable, for the chances are good that one or more of the jurors will be married men and will have some knowledge of how frequently such conditions cause all kinds of nervousness in women.)

Q. Are you familiar with any rectal troubles, which by continued irritation gradually develop nervousness? (Yes.)

Q. Such conditions as irritable or bleeding piles, painful fissure of the rectum, painful ulcer of the rectum, etc.?

Q. You assume, of course, as the subject was not mentioned in the hypothesis that none of these conditions existed in the hypothetical woman?

Q. Do you know whether this hypothetical woman was anaemic; it was not stated to you in the question?

Q. You will agree, will you not, that impoverished conditions of the blood is a recognized cause of nervousness?

Q. Do you know, by the way, the relative constituents of normal blood—the number, in a cubic millimeter, of red corpuscles, white corpuscles, etc.? (This, of course, not to a well qualified man.)

(If a urinalysis has been omitted in the hypothesis, a dozen questions may be asked which cannot hurt and may help you.)

Q. I suppose, doctor, many cases of nervousness are due to faulty elimination of waste products by way of the kidneys?

Q. Retention of urea and its various salts sometimes so poison the nerve centers as to produce convulsions or unconsciousness, is that true doctor?

Q. This is so well recognized in your profession that you give these conditions technical medical names, do you not?

Q. What are those technical names?

Q. Are you acquainted with the conditions known as uremic coma and uremic convulsions?

Q. Will you agree with the proposition, doctor, that in studying a case and investigating the cause of a nervous condition it is often valuable to make a careful chemical and microscopical examination of the urine?

Q. What do you mean by the term—focal infection?

Q. Are your views in harmony with the modern theory of your profession, that locked up poisonous matter in the tonsils, root cavities of the teeth, sinuses connected with the upper air passages and in many other parts of the body, is often absorbed into the system and produces very deleterious effects upon the nervous system as well as upon other body structures?

Q. Did you assume that in the hypothetical question presented to you the hypothetical person had no such focal infection in any part of her body?

Q. Did you do this, although no X-ray or other examination was made to exclude such conditions?

In some instances above, I have indicated the answer (Yes); if the witness should answer no to such questions, it would be easy to destroy his usefulness to plaintiff, because his lack of integrity and medical knowledge could be established by the defense.

The same general line of questions may safely be propounded with reference to the stomach, the liver, the intestinal tract, the heart, lungs and bronchial tubes, the special senses of sight and hearing, to say nothing of the many causes of nervousness which originate outside of the body, such as family, domestic and business troubles, the effect of hard work, long hours, sedentary habits, etc., all of which have a great bearing upon the production and continuance of nervousness.

After taking the plaintiff's medical expert—and often the attending physician too—through a line of examination like this, on the single subject of functional nervousness, you are in a position to make something of a climax in conclusion by saying:

Q. I take it, doctor, that you simply answered the hypothetical question as it was presented?

Q. You did not take anything into consideration in giving your answer that was not mentioned to you in the question?

Q. You did not have in mind, of course, any of the many other possible causes of the nervous condition?

Q. You simply assumed as the question indicated, that the accident occurred as stated, that the nervousness followed and continued as stated, and you expressed the opinion *on that hypothesis* that the accident and the nervous condition might be related as cause and effect?

Q. I suppose to be perfectly candid, doctor, you would be willing to admit that they might not be so related?

Q. Is it not a fact, doctor, that in the hypothetical question given to you, there is no cause mentioned other than injury to account for the symptoms?

This theory of asking questions of medical men on cross-examination that will elicit answers that cannot hurt you and may possibly help you can be utilized equally well in practically all cases.

Take surgical conditions like hernia, floating kidney, etc., as example; you may go as far as you like in examining for non-traumatic causes of these conditions and you are sure to get admissions that are damaging to the plaintiff's case and valuable to the defense.

Don't take the chance of trying to prove your medical theory by an adverse medical witness, especially when that witness on direct-examination has committed himself to opinions which are opposed to you, but rather as indicated by the questions I have suggested get him to admit other possible causes for the condition claimed.

Introduce evidence to back up your contention by your own medical men, and some attorneys put such witnesses on at the end of their case so that plaintiff will have but little opportunity to bring in rebuttal evidence. Ordinarily, however, little is to be feared from any attempted rebuttal on such lines as I have indicated.

In reference to medical witnesses for the defense, if you have obtained examination of the plaintiff at any time since the accident occurred, it is a weakness in your case if you fail to call the doctor. His examination may have revealed some objective evidence of the injury, especially so if made soon after the occurrence. But a frank statement of these conditions will establish confidence with the jury and place them in a receptive frame of mind when he expresses his opinion as to duration and ultimate outcome of the injury, and if your examining physician has been properly chosen and understands his work, it will be remarkable if on the occasion of the examination he failed to discover some non-traumatic trouble or to have learned something in the past history of the plaintiff that will not be valuable to the defense.

Do not make an expert witness of your examining doctor unless he is specially qualified, but make him a fact witness as to his findings and bring out any admissions against interest which he may have obtained. Plaintiffs' attorneys have a faculty of cross-examining your examining doctor at great length and being brief with your expert witness, who is usually a better qualified man.

In presenting medical opinion evidence, endeavor to use a doctor who has specialized and has had large experience in the subject matter before the court. Do not use a neurologist for a purely surgical case and vice versa. *Drag* out of him his course of study, duration of practice, hospital experience, college and teaching positions, etc. It will be received better by the jury than if he is given five or ten minutes to detail the wonderful opportunities he has had to acquire his skill and cleverness.

Use a physician who knows how to explain medical, surgical and pathological terms in common every day Main Street language and who will avoid as far as possible the use of technical and unnecessary medical terms.

Never use a medical expert who cannot control his temper. Select a man who can maintain his professional dignity with a smile and a pleasing manner regardless of the provocation.

It is important that your witness be a man who understands a hypothetical case and knows how to answer it responsively and in language that accords with legal requirements. He should avoid anything that might be construed as a desire to make a speech from the witness stand, yet he should be ready to give reasons for his answers and his opinions *if asked to do so* in a plain, simple and convincing manner and in a voice that can be heard without effort by the court and the entire jury.

It is equally important that your attorney should not confuse his assumed case with the case at bar and also to be thoroughly familiar with the correct phraseology for the termination of his hypothetical question.

Much criticism has been made of expert medical evidence. My opinion is that it is the abuse or the incorrect use of such testimony that is open to criticism. A year ago at our meeting at Atlantic City a legal representative of one of the large properties expressed his belief that this form of testimony was of no value whatever; that no one on the jury would believe it and that it would be much better to use the money expended in this way to pay judgments. By his methods and with the materials he used, his opinion may possibly have been correct, though in this jurisdiction, as I have indicated, the use of medical evidence has proved to be of value.

Importance of Publicity

West Virginia Utility Men, Meeting at Charleston, Plan to Promote It

AT THE annual convention of the Public Utilities Association of West Virginia, held at Charleston on Oct. 20 and 21, plans were made for a publicity campaign in the state to educate the public concerning the utilities. M. H. Aylesworth, executive manager of the National Electric Light Association, told of the advertising campaign launched by the body he represents.

Former Governor W. A. MacCorkle was toastmaster at a dinner given the delegates at the Kanawha Hotel, at which Mr. Aylesworth declared that within the next ten years public utilities will sell their securities over the counter in scrip form. He contrasted customer ownership of public utility stocks with political ownership and showed to what an enormous extent the people by direct ownership and through ownership by life insurance and other mutual companies were interested in the welfare of public utilities. Dozier A. Devane of Washington, D. C., a former member of the Florida Railroad Commission, supported Mr. Aylesworth's views and advocated that employees "sell" their companies to the users of public service.

W. H. Hallanan, State Tax Commissioner, said that next to the banks the public utilities are taxed closer to the legal mark than any other taxpayers in the state. He depreciated the idea of municipal ownership, as it withdrew taxable assets from the tax lists.

Governor Morgan asserted that he knew of some public utilities that were taxed higher than their properties would sell for on the open market. Speaking from his four and one-half years' experience on the Public Service Commission, he urged that all public utilities continue to give improved service and when increases are needed ask for only as much as is their just due. He condemned municipal ownership and said paternalism and bolshevism, which he described as socialism in action, were the two arch enemies of government.

The association elected C. P. Billings of the Wheeling Traction Company president. Vice-presidents chosen were C. H. Brues of Wheeling, Mentor Hetzor of Moundsville and W. R. Power of Huntington. A. M. Hill was re-elected treasurer and A. Bliss McCrum, secretary.

Express Rates Before State Commissioners

AT THE suggestion of the Interstate Commerce Commission, the subject of express rates, which has been instituted for investigation by the Commission, known as Docket 13930, and set for hearing in Washington on Nov. 20, will be added to the program at the convention of the National Association of Railway & Utility Commissioners to be held at Detroit beginning Nov. 4. Chairman McChord of the commission suggests that this express case would be a particularly apt one in which to apply in full the co-operative plan between the Interstate Commerce Commission and the state commissions with respect to both classes of rates, intrastate and interstate. Chairman McChord will be in attendance at this convention. The program for the meeting at Detroit was referred to in the *Electric Railway Journal* for Oct. 21.

Power and Mechanical Engineering Exposition to Be Held

A NATIONAL exposition of power and mechanical engineering will be held for one week beginning Thursday, Dec. 7, 1922, in Grand Central Palace, New York City. This will come at the close of the meeting of the American Society of Mechanical Engineers and the American Society of Refrigerating Engineers. There will be displayed steam turbines, steam engines, steam boilers, feed-water heaters, superheaters, economizers, metering devices, stokers, coal-handling apparatus, valves and pipe fittings, etc. The advisory committee of the exposition includes men prominent in the national engineering societies, among them being M. R. Bump, of the Doherty Organization; E. B. Katté, chief engineer of electric traction, New York Central Railroad; F. R. Low, editor of *Power*; D. S. Kimball, president American Society of Mechanical Engineers, and others.

Education for Highway Engineering and Transport

THERE will be held in Washington, D. C., from Oct. 26 to 28, the Second National Conference on Education for Highway Engineering and Highway Transport under the auspices of the Highway Education Board. The chairman of this board is John J. Tigert, United States Commissioner of Education. The board also comprises the chief of the Bureau of Public Roads, a colonel of the Corps of Engineers, U. S. Army, and representatives of the National Automobile Chamber of Commerce, the Society for the Promotion of Engineering Education, the Rubber Association of America and the Society of Automotive Engineers. The papers and discussions will have to do not only with educational matters, but also with the general aspects of the subject.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Jitney Elimination Question

Buffalo Situation Clears Up as 375 Jitneys Are Ordered to Stop After Injunction

The strike of platform employees on the local and interurban lines of the International Railway, Buffalo, which is entering its fifth month, is a dead issue and the situation has now resolved itself into a fight on the part of the railway to rid the streets of jitneys, which continue to operate in defiance of the law and court injunctions.

INTERNATIONAL OPPOSED TO MR. HOADLEY

Joseph H. Hoadley, New York, president of the Manhattan Transit Company, and H. D. Chapin, New York, a representative of the company, are under arrest on warrants charging conspiracy to violate the transportation corporation law. The International Railway is the complainant. Members of the Buffalo Jitney Owners' Association are alleged to have leased their cars to the Manhattan Transit Company, which claims authority to operate vehicles for a 10-cent fare.

For the privilege of operating a jitney as a unit of the fleet of the Manhattan Transit Company in Buffalo, each driver or owner agrees to pay $50 in five installments of $10 each and $1 a day, besides contributing to the cost of supervision, inspection and regulation, which would be close to 75 cents a day.

Another clause in the lease gives the Manhattan company exclusive right for advertising space and privileges in each jitney. It is the contention of the International Railway that the Manhattan company would receive more than $155,000 from Buffalo jitney owners on this basis without any overhead expense. Officers of the Jitney Owners' Association would receive more than $102,000 for supervision, inspection and regulation expenses.

INJUNCTION IS ISSUED

Justice George E. Pierce in Supreme Court has issued an injunction restraining the Manhattan Transit Company from operating buses in the streets of Buffalo. Application for the injunction was made by Henry W. Killeen of Penney, Killeen & Nye, attorneys for the International. After the arrest of President Hoadley and the issuance of the injunction order, the Manhattan Transit Company called off the operation of 375 jitneys which have been operating in Buffalo under licenses issued by the New York company through Mr. Hoadley.

Even the operation of 16-cent jitneys in Buffalo is illegal, Justice Harry L. Taylor has ruled in Supreme Court. It was the contention of the jitney owners that by charging 16 cents they would not have to secure a certificate of convenience and necessity from the Public Service Commission because that applies only to vehicles operating through the streets at a rate of fare of 15 cents or less. The court has also ruled that automobiles run for hire cannot operate over a fixed route paralleling the lines of the traction company.

The Appellate Division, Fourth Department, Supreme Court at Rochester, has reversed Justice Charles Pooley in Supreme Court at Buffalo, who, on Aug. 7, granted a peremptory writ of mandamus to the International Railway, directing Mayor Frank X. Schawb to enforce certain provisions of the transportation and highways law. Presiding Justice Frederick W. Krause in his prevailing opinion reviews the history of the Buffalo street car strike and says that it is his opinion that the issuance of the writ of mandamus was an unwarranted interference in details of executive power and that, in the exercise of the judicial discretion, the application should have been denied.

In touching upon the legality of jitney operation in Buffalo, Justice Krause says:

> I think it clearly appears that many of these vehicles were operated in violation of law and such violation has been held to be misdemeanor under Sec. 29 of the Penal Law, but the mere fact that an automobile driver or owner permits others to ride in his vehicle is not unlawful jitney service.

CONFERENCES ON SERVICE AT COST UNDER WAY

The first of a series of conferences were held early in the week between representatives of the city and three representatives of the International with the view of working out a service-at-cost plan for the local lines of the traction company. The meeting was secret. While the conference was being held, delegates of the Amalgamated Association of Street & Electric Railway Employees from all parts of the United States and Canada were holding a secret session in McLeod's Hotel to discuss ways and means for the support of Buffalo strikers and their families during the winter months.

Mayor Ernest B. Crosby of Lockport, by authority of action taken at a public hearing a week ago, has sent to the Lockport Common Council his appointment of a committee of five citizens to consider the purchase and operation of the local lines of the International in Lockport. There has been no local service in Lockport since the strike was called, July 1. The city is without authority to purchase and operate traction lines, but it is declared that a bill will be introduced into the State Legislature this winter to enable the city to acquire the property.

Mayor's Plan Ridiculed

Head of New York Commission Characterizes Hylan's Billion Dollar Proposal as Impossible

The plan of Mayor Hylan of New York for new transit construction has been characterized as "impossible" by George McAneny, chairman of the Transit Commission. In a detailed statement attacking the Hylan plan and the Mayor's refusal to co-operate for the building of needed subway lines, Mr. McAneny has supported his description of the Mayor's plan as chimerical with the following reasons:

> 1. Because the Mayor predicates his new lines on the basis of municipal operation, which, according to Mr. McAneny, is entirely dependent upon the policy of Hylan's successors. Furthermore, the transit chairman maintains that such a basis of operation will not be feasible for many years.
> 2. Because the city cannot finance the Hylan plan of new construction, which, Mr. McAneny declares, would require an expenditure of $1,063,000,000 rather than the $600,000,000 estimated by the members of the Board of Estimate. The city would have to spend $500,000,000 to carry out the first five years' work contemplated in the Mayor's program, according to Mr. McAneny.
> 3. Because the Mayor's insistence upon municipal operation for the lines to be built would, according to Mr. McAneny, mean that they would not become an integral part of the present system. The result, the transit chairman asserts, would be a piecemeal system over which a single 5-cent fare would be a physical impossibility.

Mr. McAneny declared that the promises the Mayor has been making to communities all over the city that such lines will be built merely because he now puts them on a paper map are not only empty promises but part of a plan of deception that the people themselves should resent.

Asserting that the Hylan Administration has delayed and obstructed and blockaded every attempt to solve the problem of increased facilities, Mr. McAneny says it was "inconceivable that the people of the city will themselves brook any further delays when the situation is better understood."

Mr. McAneny gave the following itemized analysis of the cost of the Hylan plan as estimated by the Transit Commission's engineering and accounting experts:

To buy out the interests of the Interborough and B. R. T. companies in those parts of the existing lines that he proposes should be taken would cost....................	$164,000,000
To pay for the exchange of the Broadway-Bronx extensions, that is, the West Side line of the Interborough Company, for the Lexington Avenue, or East Side line, which he proposes the company shall retain, would cost, on the basis of present operating values	24,000,000
To build and equip the new subways for which his scheme provides would cost........	875,900,000
The total of these three items alone is	$1,063,900,000

Mr. McAneny said that with the addition of the building of his tri-borough bridge connecting Manhattan, Queens, and The Bronx, at an expenditure of $25,000,000 and upward, bus equipment, etc., the plan the Mayor has put forward would cost pretty nearly double the sum the Mayor claims for it. The details of the commission's program have been outlined previously.

Future Form of Transportation for Pasadena Before City Directors

The City Directors of Pasadena, Cal., who have been studying its future transportation problem for the past eight months, have now before them many different solutions offered from various sources, and yet have reached no decision. They have been studying transportation in executive sessions for the most part. They have visited Long Beach to inspect transportation affairs in that city and with particular reference to the bus system operated.

On Oct. 4 the Pacific Electric Railway applied for a forty-year franchise extension, and the City Directors in turn denied the application without comment. On the same day that the application was presented the directors also heard from a recently organized transportation body known as the People's League and from the jitney owners, both opposed to the railway. The jitney owners sent notice to the directors through their organization at the same time that it was preparing petitions for a traction initiative at the November election, which would require the directors to grant five-year permits for bus operation.

The new Pacific Electric proposal, except for the forty-year franchise, is virtually the same as previous proposals, whereby the company in seeking renewals of some of its franchises now about to expire agreed to make an expenditure of approximately $800,000 in improvements to its local lines, as well as extensions, in Pasadena.

The railway requests a double-track franchise on Los Robles Avenue from California to Washington street, a franchise to extend a single-track line on North Los Angeles Avenue from Washington Street to Woodbury Road, and the renewal of its double-track franchise on East Colorado Street from Hill to Lake Avenues.

The Merchants' Association of Pasadena has urged that the Pacific Electric proposal, which follows the lines of an engineer's report made to the directors of the city, be submitted to the vote of the people. The Federated Improvement Association is campaigning to the effect that it wants both the Pacific Electric and the bus proposals submitted to the people, and the other proposition is in the form of an initiative petition in circulation to require the city to accept the bus proposition. Municipally owned buses have been recommended from several sources. The problem is complicated for the City Directors due to the fact that the jitney owners appear to be able to get referendum signatures enough to hold up any transportation policy that may be adopted. One ordinance regulating jitneys in the city of Pasadena has already been defeated in this manner.

Double Trolley to Go

District of Columbia Commission So Decided Following Investigation and Hearing

Authority to abolish the double trolley system has been granted the traction companies of Washington by the District of Columbia Public Utilities Commission following an investigation by the commission and a public hearing at which no opposition developed.

For many years four lines in Washington have been operated by double trolleys, three by the Washington Railway & Electric Company and subsidiaries and one by the Capitol Traction Company. One line using the former's tracks has been in the peculiar position of having been operated by three systems, single and double trolley and underground slot.

Investigation by engineers of the Public Utilities Commission disclosed the fact that the detention factor was considerably higher on lines with the double trolley system than on those with single trolley, grounded return system, due to more frequent breakage, increased danger of crossing and other elements.

Evidence at the hearing showed that the possibility of the electrolysis of underground structures with a single trolley, grounded return system, if properly designated, constructed and maintained, "is extremely remote." It was this claim of danger of electrolysis which originated the demand for the double trolley system and kept it in effect for many years on the older lines of the District of Columbia. The evidence also showed that the double overhead trolley system presents operating difficulties which result in inconvenience and possible danger to the public as well as considerable added expense to the companies.

The commission directed that the companies, in making replacements by installing the single trolley system, fulfill these requirements:

> Each rail joint shall be bonded with an electrically welded, unconcealed bond; the rails of each track shall be cross-bonded at intervals of not more than 500 ft.; double tracks shall be completely cross-bonded at intervals of not more than 1,000 ft.; jumper bonds shall be installed around each piece of special work; each such bond, cross-bond or jumper-bond shall be equivalent to No. 0000 copper wire and shall at all times be maintained in good condition and in thorough contact with the rails.

Previous to this hearing, the companies had tried several times but without success to have the change brought about.

The order, when carried into effect, will leave two systems of power-feed in effect for the street cars of Washington, the single overhead trolley and the underground slot. All lines in the business district use the underground slot, and some have this system their full length. In the outskirts of the city the majority of the lines use the overhead trolley.

Obtains Permanent Injunction Against Striking Employees

The temporary injunction issued out of United States District Judge Bledsoe's court in Los Angeles in July, 1918, restraining members of the locomotive engineers' and trainmen's unions from interfering with the operations of the Pacific Electric Railway lines, which was due to a strike being called by the trainmen, was made permanent by a decision rendered several weeks ago by United States District Judge Frank H. Rudkin of Spokane, Wash.

Judge Rudkin heard the case in Los Angeles in March, 1922, which was fully reviewed in the *Electric Railway Journal*, issue of March 18, 1922, and the Judge has had the case under consideration ever since. The suit was brought by the Pacific Electric Railway against M. E. Montgomery and other officials of the railway unions, and it was upon this that the action of Judge Bledsoe was based when he issued the restraining order against the unions temporarily in July, 1918. Some time ago a motion was filed by the unions for the dissolution of the injunction obtained four years ago, it being the declaration of the unions that all excuse for the action of the court had now passed. However, the position of the unions was combated by the railway and much testimony was taken by both sides at the time of the trial held in March, 1922.

The present suit was brought against certain union leaders and unions and the general object of the case was to obtain an injunction restraining the defendants from interfering with the contractual relations existing between the plaintiff and its employees.

This temporary injunction was allowed and later on approved by a higher court on appeal.

Toledo Considers Use of Pass

After a consultation with Walter Jackson in Toledo during the week ended Oct. 21 Street Railway Commissioner Wilfred E. Cann declared that he was favorably impressed with the weekly pass. He said the question of adopting the pass for use in Toledo would depend largely on Mr. Jackson's analysis of traffic data which he took with him when he left for his home. Mr. Cann has asked Mr. Jackson to submit his findings in the nature of answers to several definite questions. Mr. Cann said:

> If we could sell 14,000 passes a week we could obtain the equivalent of the present total revenue of the lines.
>
> Riders usually use the pass from 3.2 to 4.5 times a day according to averages we have been able to obtain.

Commissioner Cann told a group of business men that rejection of the one-man cars would not deter him from his efforts to improve service and that he would probably urge the use of trackless trolleys for some extensions next summer.

The Council would probably have to give special permission for a trial of the weekly pass. Mr. Cann has not said what the price of the pass would probably be.

Favorable Comment on Plea for Relief from Paving Charges

Both the Oshkosh *Northwestern* and the Kenosha *News* have commented in their editorial columns recently on the declaration made by Carl D. Jackson, chairman of the Wisconsin Railroad Commission and president of the National Association of Public Utility Commissioners, that the present law which requires electric railways to pay for pavements between their tracks is all wrong and should be repealed.

Mr. Jackson explained that the plan originated when horse-drawn street cars were in vogue, and it was based on the idea that the horses wore out the pavements, wherefore their owners, the street car companies, should stand the cost of pavement construction and replacement. The old horse cars, however, no longer are used, so that in view of this changed condition, justice calls for the abandonment of the present plan of assessing costs of paving improvements where street car tracks are concerned. Mr. Jackson then went on to explain how the paving costs assessed against the railways are passed on to the consumer.

All the points made by Mr. Jackson have been made before from time to time, but it is seldom that the newspapers have reacted so favorably to them. Thus the *Northwestern* said:

> There seems to be much merit in the line of argument advanced for a change in the present method of assessing costs for pavements between street car tracks. It is a real injustice, moreover, to penalize the street car riders in this manner, and it obviously is opposed to public welfare to make street car service cost more than it should, which is the actual result of the present policy. And now that attention has been called to this question, it is the duty of the public representatives to give it careful consideration and to revise the law, if as claimed, the law is working to the detriment of general public interests.

The *News* said in part:

> Mr. Jackson is offering a decidedly meritorious line of argument when he suggests that the railway companies should be asked to sell transportation and nothing else. His reasoning is excellent and the people are going to come to see it in the very near future. Street railway companies are not going to operate unless there is a chance for them to earn profit or an indication that they will develop such an earning chance. Added burdens must be eliminated if the street cars are to be kept going and the fare kept at a rate which the people can afford to pay and be willing to pay.

Application of Staley System Before the I.C.C.

An application has been made to the Interstate Commerce Commission by W. L. Staley, the president of the Staley System of Electrified Railways, for the requisite authority to retain the excess earnings as allowed newly constructed lines. In this petition Mr. Staley sets forth that he plans to construct an electrified railroad with 950 miles of main line and 225 miles of branch lines to serve points between the southwestern border of Colorado and a point on the Gulf of California.

The petition sets forth that the principal purpose of the line is to transport coal and coke from the Gallut-Durango fields of Colorado to the mining and metallurgical industries of southern Arizona. The proposed line intends to serve the following places: Durango and Cortez in Colorado; Luna, Grants, Bluewater, Farmington and Aztec in New Mexico; Tucson, Casagrande, Phoenix, Florence, Winkleman, Safford, Solomanville, Clifton, Morenci and Metcalf, in Arizona.

The petition points out that the country to be traversed is rich in mineral, forest and agricultural resources. The line is intended to furnish an outlet for their products to tidewater.

An outline of the plans of the Staley system for building the new lines was published in the *Electric Railway Journal* for Sept. 2, page 334.

Inquiry Into Bus Operation Proves Lively

The New York Transit Commission has taken up recently as part of its inquiry into traction affairs the subject of bus operation in New York City as fostered by the city itself. Most of the present services of this kind were started as emergency routes to afford means of communication following the suspension of surface line car operation. Many of the buses are run by individuals and service has been proved by the commission to be totally unreliable so far as schedules are concerned and wholly inadequate to meet traffic demands. The degree of overcrowding at certain points has reached very high proportions, proportions higher even than are on record on any of the transit lines even at the hours of traffic saturation.

Buses have been leased to individual operators, and on account of their lack of financial responsibility a total of more than $1,000,000 in potential damage claims has piled up against the city. Moreover, the whole operation of the buses appears to be hedged about with politics. In this connection individual operators have told on the stand of payment said to have been demanded of them to secure preferment in the matter of the assignment of routes and it has been brought out that Mayor Hylan's son-in-law's brother is in the business of furnishing insurance to drivers of the bus lines. An Alderman is also in the business of insuring buses. Counsel Shearn of the commission said that he always wondered about the interest displayed by Mayor Hylan in his own $25,000,000 bus proposition, but that "after looking into this business a little bit I can understand it better, for the testimony indicates what choice pickings there would be in it for the politicians."

Bill in Prospect for Control of Utilities in British Columbia

The Federal Government has removed the British Columbia Electric Railway, Vancouver, B. C., from the control of the Board of Railway Commissioners. The Union of British Columbia Municipalities has long been protesting against the policy of federal control of a corporation operating thousands of miles from Ottawa, the government seat.

At a recent convention the British Columbia municipalities went on record as favoring the appointment of a provincial public utilities commission and a bill is now being prepared which will provide for the control of public utility corporations within the province of British Columbia.

The details of the plan which will be submitted to the Legislature next month have been outlined by A. M. Manson, Attorney-General. According to the bill a permanent commission will not be formed.

In disputes relative to rates and service, the government will be empowered to appoint a commission or sole commissioner under the public inquiries act to deal with the controversy and render a decision. The government will grant such an inquiry upon application in writing from the municipal council affected or from 100 or more provincial voters residing in a district affected, but without municipal organization, or from the company.

The commission will have complete jurisdiction over fares for passenger service. The bill provides that, in considering rates, the commission is to "have due regard to giving the company a fair and reasonable return upon the appraised value of the property of the company and to the protection of the public from rates that are excessive."

Extensive Bus System Planned for Chicago

Plans calling for 70 miles of bus route on the south side of Chicago, Ill., 40 miles on the west side and 30 miles on the north side, and greatly increased service on existing routes of the Chicago Motor Bus Company have been announced by financial interests which recently gained control of the Lake Shore Motor Bus Company. This is the holding company for the Chicago Motor Bus Company, the operating company, and the American Motor Bus Company, which is the manufacturing company. Financial control has been secured by John A. Hertz, president of the Yellow Cab Company; Charles MacCulloch, president of the Parmelee Transfer Company and vice-president of the Yellow Cab Manufacturing Company; W. H. Wrigley, Jr., and other Chicagoans with extensive financial connections. John A. Ritchie, formerly president of the Fifth Avenue Coach Company of New York City, has been elected president, general manager and a director of the company. G. A. Green, formerly of the Fifth Avenue Coach Company, has also joined the Chicago company.

The buses to be operated will be of a design combining features of the L type coach of the Fifth Avenue company with the latest open-top doubledeck model of the Chicago Motor Bus Company. They are to seat sixty-eight persons. The company expects to spend $3,500,000 in building a bus system.

Trunk routes will operate into the Loop district. The fare is to be 10 cents.

Financial and Corporate

Reorganization Slow Work

Difficulties Encountered in Putting Through Pittsburgh Plan Are Expected to Be Removed

Nothing definite of an official nature has been made public now for some time about the development of the plans for the reorganization of the Pittsburgh (Pa.) Railways. In consequence it might be supposed that the work of completing the plan has been allowed to drag, but that is not the fact.

The interests charged with the responsibility for arranging to carry the matter through have been diligently at work, and have made considerable progress in working out the details. They have, however, encountered several stumbling blocks to further progress. These would seem to make it impossible to comply with the time limit fixed by the Public Service Commission within which to meet certain conditions, but the difficulties encountered are not regarded at this time as presenting barriers insurmountable.

To be as specific as the information available will permit, questions have come up for settlement in connection with the raising of $5,000,000 of new money for use in providing improvements, in connection with the exchange of some of the underlying securities for securities in the new company, and also in connection with acceptance of the new plan by some of the municipalities. The interest rate and length of the term of the new loan are said to be the stickers on that issue.

With respect to the underlying liens, it is understood that some holders are insisting upon a direct guarantee of principal and interest from the Philadelphia Company as a condition of their assenting to the new plan. This was not contemplated under the terms of the preliminary reorganization plan, and the Philadelphia Company, which controls the Pittsburgh Railways Company, is understood to be standing out for the acceptance of the plan of all holders without any preference to them except such as naturally adheres under present priority rights of the holders as fixed by the existing liens on the physical property or on earning power.

As for the municipalities, more than 125 in Allegheny and Washington Counties are entered by the railway and not more than twenty-five, including Pittsburgh, are reported to have accepted the reorganization ordinance. This, however, is regarded as the least troublesome of the problems encountered.

It will be recalled that the railway was to have been reorganized with a capital of $62,500,000, the valuation placed upon the property in the spring of 1920 by the State Public Service Commission. A traction conference board was to have been created, to supervise an annual budget of the proposed new company, and to which Pittsburgh and other municipalities, the latter combined, would elect members.

It was first proposed, when former Mayor E. V. Babcock and the City Council approved the plan a year ago, that the reorganization should be started last March 1. Then it was made June 1, which date the State Public Service Commission fixed. A postponement was obtained by the Philadelphia Company to Nov. 1.

As indicated previously it is confidently believed that all the difficulties which have so far presented themselves will be ironed out satisfactorily, but the need may arise for modifying the reorganization plan slightly. With this in mind a meeting was held a few days ago at which Mayor William A. Magee, members of the City Council and Arthur W. Thompson, president of the Philadelphia Company, and the legal advisers of the company and the city all conferred. The outcome of the deliberations was not announced beyond a statement indicating that the plan might have to be modified slightly, but that the reorganization would undoubtedly go through with its main terms unaltered.

The principal provisions of the terms of the ordinance under which the reorganization is to be carried out were reviewed in the *Electric Railway Journal* for Nov. 21, 1921, page 967.

Seattle Municipal Road Reports Profit

The Seattle Municipal Railway operated with a margin of $39,001 over all actual expenditures during the month of August, according to figures compiled by D. W. Henderson, general superintendent of the line. The gross revenues were $535,469, and the total expenditures were $496,457 including $70,250 set aside for redemption of bonds, $20,000 for depreciation and $69,287 for interest. This does not take into consideration $57,092 charged to depreciation, only $20,000 of which actually is set aside for that purpose by the City Council. The operating expenses were $394,012. Figures show that all railway lines now are taking in more revenue per car mile than it is costing to run them per car mile. The four bus lines, however, are costing more per car mile than the revenue on the same basis.

Will Redeem Bonds.—The Southern Colorado Power Company, Pueblo, Colo., formerly the Arkansas Valley Railway, Light & Power Company, will redeem on Nov. 1, 1922, all the $4,475,300 outstanding first and refunding mortgage sinking fund bonds of the old Arkansas company.

Successor Company Formed

General Gas & Electric Corporation Acquires Assets of General Gas & Electric Company

As of Sept. 15, 1922, the General Gas & Electric Company sold all of its assets to General Gas & Electric Corporation. In payment therefor the latter corporation issued to the General Gas & Electric Company the following stock of General Gas & Electric Corporation:

12,500	shares of cumulative preferred stock, Class A
12,500	shares of cumulative preferred stock, Class B
40,259	shares of convertible preferred stock
45,154	shares of common stock

and assumes all liabilities of the General Gas & Electric Company.

The new corporation is a Maine corporation with an authorized capital stock of 450,000 shares, without nominal or par value, subdivided into:

130,000	shares of cumulative preferred stock, Class A
70,000	shares of cumulative preferred stock, Class B
100,000	shares of convertible preferred stock
150,000	shares of common stock

On Oct. 2 a dividend of $2 a share on General Gas & Electric Corporation cumulative preferred stock, Class A, was declared, being at the rate of $8 per share per annum for the quarter ended Sept. 30, 1922.

The cumulative preferred stock of the General Gas & Electric Company is exchangeable for cumulative preferred stock, Class A, and cumulative preferred stock, Class B, of General Gas & Electric Corporation, on a basis of half a share of Class A stock and half a share of Class B stock for each full share of cumulative preferred stock of the General Gas & Electric Company.

The Guaranty Trust Company, New York, has been appointed depository for the purpose of effecting this exchange, and in addition to the Class A and Class B cumulative preferred stock of General Gas & Electric Corporation, the holders of the General Gas & Electric Company's cumulative preferred stock will receive at the time of exchange their proportion of the dividend declared on the cumulative preferred stock, Class A, of General Gas & Electric Corporation.

In connection with the acquisition by General Gas & Electric Corporation of all the assets of the General Gas & Electric Company and the assumption of all the liabilities, General Gas & Electric Corporation has arranged to issue $2,060,100 principal amount of 7 per cent, sinking fund gold bonds, Series A, in exchange for a like principal amount of outstanding 6 per cent ten-year secured gold bonds of the General Gas & Electric Company. This represents 50 per cent of the 6 per cent ten-year secured gold bonds outstanding as of Sept. 15, 1922.

The 7 per cent sinking fund gold bonds, Series A, of General Gas & Electric Corporation are dated Sept. 1, 1922, mature Sept. 1, 1952, bear 7 per cent interest payable semi-annually on March 1 and Sept. 1, and have as collateral security the 6 per cent ten-year secured gold bonds of the General Gas & Electric Company surrendered for exchange. The trust agreement securing the General Gas & Electric Corporation bonds provides for a graduated sinking fund which will retire all the bonds prior to maturity.

The General Gas & Electric Company controlled the Reading Transit & Light Company, Rutland Railway, Light & Power Company, and Northwestern Ohio Railway & Power Company.

Practically All East St. Louis Stockholders Accept Terms

The offer of the North American Company, New York, N. Y., to purchase the stock of the East St. Louis & Suburban Railway has been accepted by 98 per cent of the preferred and 95 per cent of the common shareholders, who have deposited their stock for transfer under the terms offered. Time fixed for deposit was Oct. 16, but a short extension has been granted to enable those who have not yet deposited their stock to do so. The management is offering the few outstanding stockholders who prefer to sell their stock outright to accepting the original terms of the offer, market prices of $50 a share for their preferred and $9 a share for their common stock. The original offer was at the rate of $55 for the preferred and $10 for the common, payable one-half in North American preferred at $50 a share and one-half in common at $100 a share.

Sioux City Property Changes

The Sioux City Gas & Electric Company, Sioux City, Ia., a majority of whose outstanding stock is owned by United Gas Improvement Company, Philadelphia, Pa., is acquiring the electric generating plant and distribution system of Sioux City Service Company, thus placing the entire electric light and power and gas business in Sioux City under its ownership. It will also own most of the outstanding stock of the Service company, which will continue to operate the city's street railway and heating business. The present financing provides funds to retire at par the $2,051,000 outstanding first 5s of the Service company. Upon completion of this financing there will be outstanding $1,779,300 of 7 per cent preferred stock, $4,000,000 of common and $4,500,000 in first mortgage 6s.

Reorganization Plan in Prospect

In the belief that the Missouri Public Service Commission will allow a valuation of not less than $65,000,000 on the United Railways of St. Louis, the protective committee of preferred stockholders has issued a call for the holders of this stock to deposit their shares with the committee on or before Nov. 15. F. O. Watts, president of the First National Bank of St. Louis, is chairman of the committee. The total preferred stock outstanding has a par value of $16,383,000.

Walter W. Smith, vice-president of the First National Bank of St. Louis, secretary of the committee, says a hypothetical re-organization plan might be worked out on a predicated valuation of $65,000,000, and permission for the company to earn 7 per cent on that amount, somewhat as follows: Six per cent bonds to the amount of $48,000,000 would be issued in place of the existing total of $54,890,000 of funded debt and receiver's certificates. The new issue would be used to take up the receiver's certificates and pay off the underlying bonds. The remainder would be exchanged for other issues. The holders of the present securities, which bear interest at 4 and 5 per cent, would receive less in par value, but approximately an equal income since the new securities would bear 6 per cent.

On a valuation of $65,000,000, the 7 per cent return would bring in $4,550,000, of which $2,880,000 would go for interest charges. There would remain $1,670,000 in income on an equity of $17,000,000 for the preferred and common shares.

The statement issued by the protective committee said that the time had now arrived when the holders must either deposit their stock or forego the benefits which would accrue to the large number of stockholders whom the committee represented.

Financial News Notes

Service Resumption in Brooklyn.—Through the co-operation of the New York Transit Commission, Federal Judge Julius M. Mayer and Lindley M. Garrison, receiver of the Brooklyn Rapid Transit, service is to be resumed on the Park Avenue line in Brooklyn, and also a part of the Marcy Avenue route. The lines have not been run since the strike of 1920.

Receivership Case Again Postponed.—Federal Judge Mayer at New York announced on Oct. 24 that the application of the Continental Securities Company for the appointment of a receiver for the Interborough Rapid Transit Company, New York, because of a threatened default in payment of interest has been adjourned until Nov. 24, to allow the reorganization committee time to complete its work.

Expert Retained to Appraise Akron Property.—Albert S. Richey has been employed by the city of Akron, Ohio, to make an appraisal of the railway property of the Northern Ohio Traction & Light Company within the city limits of Akron. It is understood that this appraisal is to be used in the negotiations between the city and the company for a new franchise to replace the one which expires in 1924.

New Orleans Issue Offered.—An issue of $12,000,000 first and refunding mortgage 5 per cent bonds, Series A, of the New Orleans Public Service, Inc., is offered by Dillon, Read & Company, New York at 90 and interest, to yield about 5.70 per cent. The corporation has been organized to acquire the entire New Orleans Railway & Light Company under reorganization. The bonds are redeemable as a whole or in part at 105 on or before Oct. 1, 1927, at 104 and interest in the next five years, at 103 in the next five, at 102 in the next five, at 101 in the next five and 100½ prior to maturity, Oct. 1, 1952.

	Latest	Month Ago	Year Ago	Peak	1913
Street Railway Fares*	Oct. 1922 **7.00**	Sept 1922 **7.01**	Oct. 1921 **7.24**	May 1921 **7.24**	**4.84**
Street Railway Materials*	Sept. 1922 **181**	Aug. 1922 **189**	Sept 1921 **153**	Sept. 1920 **247**	**100**
Street Railway Wages*	Oct 1922 **208**	Sept 1922 **208**	Oct. 1921 **214**	Sept. 1920 **232**	**100**
Steel Unfilled orders (Million tons)	Sept. 30 1922 **6.69**	Aug. 31 1922 **5.95**	Sept. 30 1921 **4.56**	Apr. 30 1917 **12.18**	**5.91**
U.S. Bank Clearings Outside N. Y. City (Billions)	Sept. 1922 **12.82**	Aug. 1922 **12.34**	Sept. 1921 **11.47**	March 1920 **18.54**	Av. Mo. 1913 **6.12**
Business Failures Number Liabilities (millions)	Sept. 1922 **1,469** **31.92**	Aug. 1922 **1,679** **36.83**	Sept. 1921 **1,618** **46.02**	Jan. 1922 **2,722** **105.7**	Av. Mo. 1913 **1,213** **24.64**

Conspectus of Indexes for Oct., 1922

Compiled for Publication in this Paper by

Albert S. Richey

Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Peak	1913
Eng. News-Record Construction costs	Oct. 1922 **188.6**	Sept 1922 **185.0**	Oct. 1921 **182.6**	June 1920 **273.8**	**100**
U.S. Bur. Lab. Stat. Wholesale Commodities	Sept. 1922 **153**	Aug. 1922 **155**	Sept. 1921 **141**	May 1920 **247**	**100**
Bradstreet's Wholesale Commodities	Oct. 1 1922 **12.50**	Sept. 1 1922 **12.08**	Oct. 1 1921 **11.19**	Feb. 1 1920 **20.87**	**9.21**
Dun's Wholesale Commodities	Oct. 1 1922 **175.6**	Sept. 1 1922 **172.5**	Oct. 1 1921 **161.8**	May 1 1920 **263.3**	**120.9**
U.S. Bur. Lab. Stat. Retail food	Sept. 1922 **140**	Aug. 1922 **139**	Sept. 1921 **153**	June 1920 **219**	**100**
Nat. Ind. Conf. Bd. Cost of living	Sept. 1922 **155.6**	Aug. 1922 **154.5**	Sept. 1921 **164.8**	July 1920 **204.5**	(1914) **100**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Traffic and Transportation

Jitneys Menace Houston

$1,200,000 Program of Improvements Halted Pending Relief to Company by City

The City Council of Houston, Tex., has not yet taken action on the petition of the Houston Electric Company, seeking an increase in fares from 7 cents to 9 cents. When the request was presented by Luke C. Bradley, district representative for Stone & Webster, the City Council called on Mr. Bradley for additional information regarding the financial condition of the company.

At a hearing before the Council Mr. Bradley and W. E. Wood, general manager, presented a detailed financial statement showing that the company is earning less than 1 per cent on its invested capital. Operation of jitneys in competition with the cars was blamed for the depleted financial condition of the company. The request for increased fares came just two weeks after the company asked the Council to prohibit jitneys from competing with the street cars.

According to the financial statement presented by Mr. Bradley, the Houston Electric Company during six months ended Aug. 31, 1922, reported total revenue of $1,003,870. Expenses were: Operating, $773,093.17; depreciation, $140,252.07; taxes, $70,010.02, making total operating costs $983,355.26. This left a balance of $20,515.27 for income return during the six months period.

Under the terms of the agreement entered into last January between the company and the city, at the time the franchise was extended for a period of fifteen years, the company agreed to spend $1,200,000 on improvements and betterments within the period of one year. The statement presented by Mr. Bradley showed that to date the company had spent $650,515 on improvements. He added that all improvement work had been ordered stopped by the company pending an adjustment of the fare issues.

City officials charged the company with breach of promise in ordering work stopped on the improvement program. The traction men countered by declaring that the company was on the brink of bankruptcy and that unless the city extended help to it, the company would be compelled to seek other relief. An extreme measure would be for the company to bring suit in Federal court, alleging that fares imposed in the city are confiscatory. It will be recalled that the Houston Electric Company once before secured relief through the channel of the Federal court, and under the decision rendered at that time the fare was increased from 5 cents to 7 cents.

Mr. Bradley told the Council that his company could borrow no more money, and that it had been found impossible to continue the improvement program as planned.

The question of barring jitneys from the streets of Houston has been referred to the voters to be decided at the general election on Nov. 7. It was hinted by Mr. Bradley that the company would not stand by the results of that election, for it would be impossible to compete with the jitneys, and if relief was not forthcoming the company would be compelled to seek some measure of relief in the Federal courts.

Increases in Fares a Political Issue

Figures made public by the Public Service Commission at Albany, N. Y., on Oct. 19 showed that in thirty-one cities fares were increased under affirmative orders by the Public Service Commission in office under Alfred Smith as Governor, while the up-state commission appointed by Governor Miller soon after he took office had increased fares in only two cities in eighteen months.

Increases of 2 cents in fifteen cities and 1 cent in sixteen other cities were granted by the Smith commission. These increases were granted in the period between April 1, 1920, and April 25, 1921. In two cities, Poughkeepsie and Oneonta, two increases were put into effect, each of 1 cent.

Fares were increased from 5 to 6 cents in Binghamton, Elmira and White Plains; from 6 to 8 cents in Amsterdam, Auburn, Geneva, Gloversville, Hornell, Johnstown and Syracuse; from 6 to 7 cents in Glens Falls, Kingston, Mechanicsville, Newburgh, Poughkeepsie, Saratoga and Schenectady; from 7 to 8 cents in Albany, Ithaca, Jamestown, Oneonta, Port Jervis and Poughkeepsie; from 5 to 7 cents in Cortland, Glen Cove, Middletown, Oneonta, Plattsburg, Rochester, Rome and Watertown.

The commission appointed by Governor Miller equalized the fares in Albany, Troy and other cities on the United Traction system which serves these cities and Watervliet, Cohoes and Green Island, necessitating increases in Troy, Watervliet, Rensselaer, which formerly had been upheld in antiquated franchise fare limit, making Albany pay 8 cents a ride, while the other cities paid 5 and 6 cents. The fare in Albany was reduced by the present commission to 7 cents and the fares in the other cities were increased to 7 cents, thereby equalizing fares on the entire system. Decreases also were decreed in Auburn and Syracuse.

An appeal for higher fare in Utica was denied, but the company appealed to the courts and the Appellate Division annulled the commission's denial.

Minnesota Rate Act Attacked

The Brooks-Coleman act, passed in 1920 and putting rate control of electric railways into the hands of the State Railroad & Warehouse Commission, has become a factor in the campaigning by candidates for election to the Legislature in Minnesota. Senator W. F. Brooks, one of the authors of the law, has taken up explanation of the law, conditions prevailing before its passage, and the effects of the act. He is candidate for re-election. This law, next to the half-backed automobile tax enactment, has, perhaps, created more general interest than any other piece of legislation passed at the last biennial session. Out of it has grown a lot of litigation affecting the valuation of electric railways as a basis for the establishment of permanent rates, and as yet only temporary rates have been made, except in the case of Duluth.

In his opening talk Senator Brooks said there has never been a measure so misunderstood and so generally misrepresented. He had no apologies to make for the bill. Inasmuch as no attempt had been made previously to show how the law aims to protect the interests of the three factors involved, the city, company and riders, he said:

> The bill gives to the electric railway a fair return on the value of its property as determined by an exact appraisal. It gives to the carriers the best of service at the lowest possible cost. It gives to the city of Minneapolis complete control of the operation and finances of the company. The bill provides fully the methods whereby the company property may be obtained by the city for municipal ownership and operation. I know if the citizens of Minneapolis could understand the fundamental principles underlying this bill and the absolute necessity for its passage and the effect of the bill when put in operation many who are now opposing it will join with myself and the other members of the Legislature who voted for it and give it their approval and support.

Six-Cent Fare for East Cleveland

Passengers in East Cleveland, Ohio, will pay a 6-cent fare beginning June 19, 1923, as a result of the decision of the board of arbitration. Up to this time the fare in East Cleveland has been the same as that in Cleveland, which is now 5 cents.

The arbitration board was named when the Cleveland Railway insisted upon an increased rate under the terms of its franchise. The arbitrators were Fielder Sanders, former city street railway commissioner, representing the company, John W. Leadley, consulting engineer, representing East Cleveland, and Attorney Charles Higley, selected by the other two arbitrators.

The arbitration board in fixing a 6-cent rate also authorized the company to sell nine tickets for 50 cents and charge 1 cent for a transfer.

"We feel the decision of the arbitration board is fair," said W. M. Pattison, chairman of the East Cleveland City Commission. "East Cleveland people do not believe they are being imposed upon in being required to pay a cent more than a car ride costs in Cleveland in view of the longer distance. Then, too, we expect that Cleveland car fare may soon again go to 6 cents."

Hearing on Validity of Dallas Six-Cent Fare Ordinance

A hearing was set for Oct. 21 on the injunction case involving the validity of the 6-cent fare extension ordinance passed by the city of Dallas, Tex., now on appeal before the Court of Civil Appeals for the Fifth Supreme Judicial District of Texas at Dallas. The original petition seeking an injunction restraining the officials of the Dallas Railway from collecting 6-cent fares was filed by F. J. Geller and others in the Forty-fourth District Court and was heard by special Judge John W. Pope, who sustained the general demurrer filed by counsel for the company setting forth that the company was not properly a party to the suit; that it was acting merely under authority granted by the city in enactment of the 6-cent fare ordinance.

Action has not yet been taken on the petition for mandamus filed by W. S. Bramlett, et al., seeking to compel the City Commission to take action on a petition for referendum of the 6-cent fare extension ordinance under provisions of the city charter. City Attorney James J. Collins held that the fare extension ordinance was enacted with the emergency clause, and thereby was not subject to the referendum provisions of the charter.

Malden Protests Use of One-Man Car

The city government of Malden, one of the largest suburbs of Boston, has voted to ask for the discontinuance of one-man cars in that city, served by the Boston Elevated Railway. The matter has been brought officially before the Massachusetts Department of Public Utilities, so that it will have to be officially determined. At a public hearing before the department, members of the city government and of the Malden Chamber of Commerce declared that the situation created by the use of one-man cars is a menace to the whole community. The cars used were said to be the old type large semi-convertible cars that had been built for two-man operation and have been changed over for use as one-man cars.

Henry C. Atwill, chairman of the Department of Public Utilities, expressed a doubt, however, that his commission has any power to act on the petition. He said that last year the commission issued an order relative to the operation of one-man cars over a grade crossing, under a provision in law relative to grade crossings, but beyond such regulation he thought the commission had no power.

Counsel for the Boston Elevated, H. Ware Barnum, contends that the Public Utilities Department has no authority to order the one-man car off the street, that if it is to be ordered off by legislation the law will have to apply to all the railways in the State. So far as accidents are concerned, he said that the records show fewer accidents with one-man cars than with the two-man cars.

Freight Via Motor Truck Not Contemplated

Railroads, steam and electric interurbans, in California are not at present planning to pick up freight at its source through the use of motor trucks, as had been reported in traffic circles. Motor truck freight companies, which have been annexing considerable short-haul freight traffic formerly handled by railroads, have been fearing such eventuality, but according to J. T. Saunders, general freight agent of the Southern Pacific Lines in Los Angeles, there is little probability of the railroads attempting to compete with the motor trucks for the short-haul business now.

Although the truck companies have made substantial inroads on the revenues of the railroads, Mr. Saunders asserts that the railroads are helpless until the trucks are compelled to pay taxes on their gross revenues and bear their portion of maintaining state highways. When this accomplished, both carriers will be on a more equitable basis of competition.

The function of the truck, in the opinion of Mr. Saunders, is to serve the railroads by transporting freight from the surrounding country, and not in attempting to parallel the railroad lines with their routes. The railroads cannot attempt to compete with the motor truck companies on short-haul freight by operating a fleet of trucks to secure the freight at the source and convey it to the cars, which has been attempted by several other lines in large cities throughout the country. This practice is not sufficiently successful to warrant general extension because the truck companies have been able to easily undercut the railroads.

The city short haul belongs primarily to the express companies, and if the railroads should enter this field with a truck pickup service, they would be competing with the express carriers, one of the best customers of the rail lines. It may be that in time the express companies will be controlled by the railroads, and if such development materializes, the carriers would be in a better position to go after the city short-haul business in competition with the truck companies.

The growth of the motor truck business is similar to the development of the electric railway. Electric lines were able to divert the large amount of suburban traffic that had gone to the steam lines, and in order to protect themselves, the railroads have pursued the policy of acquiring the electric lines as feeders.

Some such development may take place with the truck problem. If the railroads are allowed to compete with the trucks on a fair basis, there is a likelihood of the rail lines operating truck routes into the back country to facilitate greater freight shipments.

More Five-Cent Lines in Boston

Announcement was made on Oct. 18 by Edward Dana, manager of the Boston Elevated Railway, that plans are under way for extending the 5-cent fare zones on the "L" system as a result of the increased traffic in zones already established and the decrease in the annual deficit. Mr. Dana said:

> We are making and will continue to make every effort to extend the 5-cent fare. Of course when you enter the rapid transit subway, the fare is still 10 cents, and may continue to be.
>
> But our trustees have made a careful survey of the situation on our road, and there is no doubt that as a result of their findings there will be an extension of the 5-cent fare. Generally, however, it is unwise to compare Boston with any other city from viewpoint of transportation. The city has conditions that are unique.

During the month of September of this year, with the 5-cent fare operative in some zones, the Elevated carried 28,357,507 passengers. In September, 1921, the total of passengers carried was only 26,613,458. The deficit this year was $364,000 as compared to $466,000 last year. Despite the reduction of fares there was an increase in mile trips to the extent of 133,000 during the last fiscal year, an increase of 36,000 trips over the previous year.

The total revenue for September, 1921, was $2,566,985. Last month it was $2,572,047. In 1921 the cost of service was $2,716,381. This year it was $2,615,095. The cost of service over receipts in 1921 was $149,395; this year it was $43,048. At present the 10-cent fare in Boston allows a ride of 22 miles, whereas the 5-cent ride averages only 3 miles.

Motormen and Policemen Co-operate

For the purpose of bettering the co-operation between traffic policemen and motormen the Louisville (Ky.) Railway has extended an invitation to all members of the Board of Public Safety, the chief of police and members of the city police traffic squad to attend the monthly dinner given by the company to the carhouse with the smallest number of accidents for the month. Arrangements were made for a dinner on Monday, Oct. 16, at noon for the late-run men, and at 7:30 in the evening for the day men, so that all policemen and street car men could attend.

The dinner for low accidents was captured by the Market Street carhouse during September, and incidentally the same house captured the event in September, 1921, and hadn't won it since that time. The average for the month was 8,000 car-miles per accident.

Police Judge Eugene M. Daily, who has broken up a lot of speeding in Louisville, through fines of $2 a mile per speed of motorists captured, and Alfred Selligman, attorney, with the accident department of the company, were the principal speakers on Oct. 16.

It is recognized that the motormen and traffic policemen are in close daily contact, and that through co-operation, the safety work of each can be made more effective.

Jitney Men Lose

Operators in San Antonio Must Desist From Competition With Public Service Company

Jitney men in San Antonio, Tex., have lost their fight in the higher courts against the ordinance enacted by the City Commission of San Antonio to stop the operation of jitneys in competition with the cars of the Public Service Company. The Supreme Court at Austin has just upheld the judgment of the Court of Civil Appeals for the Fourth Judicial District. The Court of Civil Appeals previously reversed the finding of the District Court in granting a temporary injunction restraining the city of San Antonio from enforcing the terms of the jitney ordinance pending hearing adjudication of the case on its merits.

The San Antonio jitney ordinance was enacted last January. It prohibited the operation of jitneys on certain streets, which in effect prevented the jitneys from running in competition with the traction company, for the only streets on which the jitneys were permitted to operate were those on which no street cars were operated. When the ordinance went into effect, A. Fetzer, and others acting for the jitney operators, filed suit for injunction in the Fifty-seventh District Court. After a hearing a temporary restraining order was granted. This temporary restraining order in effect nullified the provisions of the jitney ordinance and permitted the jitneys to operate unrestrained pending final disposition of the case.

The city took an appeal to the Fourth Court of Civil Appeals, and on hearing the case was reversed. Fetzer then sought a writ of error to the Supreme Court, and in denying this writ the Supreme Court in effect sustained the findings of the Fourth Court of Civil Appeals and denied the writ sought by the jitney men.

In seeking a writ of error to the Supreme Court, the jitney operators alleged that the city ordinance in question was "arbitrarily and capriciously passed for the sole purpose of prohibiting the operation of jitneys over the streets of the city, and that if enforced would have that effect."

It was further alleged that no necessity existed for so prohibiting the operation of jitneys, and averment was made that the ordinance was passed pursuant to a contract made by the city with the Public Service Company of San Antonio, whereby that company agreed to reduce fares to 6 cents provided the city passed and enforced ordinances prohibiting jitneys being operated over the streets of the city.

Business of Freight Traffic Increases

Figures compiled by the traffic department of the Salt Lake & Utah Railroad, Salt Lake City, Utah, reflect a vigorous development of interurban freight traffic. Estimates based on performance of the first eight months of the year indicate that carload freight shipments over the Salt Lake & Utah in 1922 will show an increase of approximately 400 per cent above those of 1916. Included in this estimate only eight principal commodities are considered.

Taking the actual carload shipments handled in former years, the following table shows the steady growth of freight traffic since 1916, the shipments of 1916 being used as 100 per cent basis:

Year.	Cars.	Per Cent.
1916	2,206	100
1917	3,215	146
1918	3,919	178
1919	7,001	318
1920	9,036	410
1921	6,619	300
1922	11,150	505

Transportation News Notes

Opposed to Bus Line.—The Tucson (Ariz.) Rapid Transit Company is protesting the proposed motor bus line into the northern and eastern sections of Tucson, claiming that all the traffic is necessary to its existence and operation. On Sept. 23 the Arizona Corporation Commission convened for a hearing on the application for such motor bus line.

More One-Man Cars for Shreveport.—The Shreveport (La.) Railways has asked the City Commission for permission to substitute one-man safety cars for the present cars on the Fairfield line. It is asserted that if the company is permitted to substitute one-man cars it will be able to improve the service and at the same time eliminate a daily deficit of $50. One-man cars have been in use on the Union Depot line for several months.

Arranging for Special Trains.—The Columbus, Indiana & Eastern and the Columbus, Newark & Zanesville traction lines, in Springfield, Ohio, are making a determined drive to secure "special car" trade which is having good results. The companies have booked a number of special train movements to conventions and football games for the next few weeks. Plans to operate special trains from outlying communities to Springfield for events at memorial hall during the coming season have also been arranged.

Experiments with Remodeled Car.—The operation between Maplewood and Dover of one of the remodeled cars of the Morris County Traction Company, Morriston, N. J., with entrance and exit at one end marks an experiment by the traction company prior to the proposed conversion of all its large two-men crew cars into the pay-as-you-leave cars with one operator. The traction company has several of the small trolley cars operated by one man on its short runs between Maplewood, Springfield and Elizabeth and Morristown and Morris Plains.

Reduction in Fares Asked in Washington—The Public Utilities Commission of the District of Columbia will grant a formal public hearing on the application of the Federation of Citizens' Associations for a reduction in fare on the lines of the Capital Traction Company. Date of the hearing will be announced later. John H. Hanna vice-president and general manager of the company, said that with passenger traffic declining and the cost of coal and supplies going up, he did not regard this as a propitious time to talk about fare reductions. Mr. Hanna said he would be prepared to give exact figures on the company's earnings or operating expenses when the hearing is held.

Jitneys Regulated by Texas Cities—At the request of the Waco (Tex.) Traction Company, the Waco City Commission has enacted an ordinance regulating jitneys and other passenger-carrying vehicles. The new ordinance prohibits drivers of such vehicles from soliciting passengers on any street on which street cars are operated, unless to fill a previously made engagement. The City of Temple, Tex., has also enacted an ordinance to regulate the operation of jitneys in that city. The new ordinance fixes a license fee of $25 payable at time of application, for a permit to operate, which is not refundable if the jitney is in operation for less than one year.

Parking Ordinance Upheld—Cities and towns in Oklahoma are exercising their lawful police powers in enacting ordinances prescribing zones in which jitneys and motor trucks operated for hire are to be parked under a decision in the Criminal Court of Appeals, which denied a writ of habeas corpus in the case of A. McGuire of Pawhuska. In the case the complainant alleged that the City of Pawhuska in enacting and enforcing an ordinance fixing the zones in which jitneys may be parked was in effect depriving the owners of such jitneys of their property without due process of law. The court held that this was not the case and that the town had full authority to enact and enforce such ordinance.

Postpones One-Man Car Operation.—The Public Service Railway, Newark, N. J., has postponed the proposed one-man trolley service on the Collingswood and Haddonfield lines as a result of a conference of representatives of the men with Martin Schreiber, manager of the southern division of the railway. The men were concerned about their ability to operate the one-man cars successfully during rush hours because of the heavy traffic on Haddon Avenue and Federal Street, Camden. They were reassured by the company on the point of possible reduction of the force. One-man cars are now being operated on the Cramer Hill, Woodlynne, Crosstown and Merchantville lines.

Legal Notes

CALIFORNIA—*Ineffective Fenders Held Not Proximate Cause of Death of Negligent Pedestrian.*

Where a pedestrian was negligent in stepping upon the track immediately in front of approaching car, the negligence, if any, of the railway company in failing to equip the car with effective fenders was not the proximate cause of the pedestrian's death and it was error to instruct the jury that, even if deceased was negligent, defendant was liable if they further found that if the car at that time had been equipped with a suitable fender, deceased would not have been killed. [Schooley vs. Fresno Traction Co., 206 Pacific Rep., 481.]

FEDERAL COURTS — *Testimony of Various Car Men that They Did Not See Plaintiff Attempt to Board Street Car Held Admissible.*

Where, in an action for personal injuries occasioned by attempting to board a street car, the particular car had not been identified, it was permissible for the company to call the motormen and conductors on cars that had passed the place of injury at or near the time thereof, to testify that they did not see the plaintiff, and knew nothing about the accident. [Fels vs. East St. Louis & S. Ry. Co., 275 Federal Rep. 882.]

GEORGIA — *Street Railway Company Must Bear Expense of Crossing.*

A steam railroad company which had received a perpetual right-of-way in a city street, laid one track, and after the construction across it of a street railway laid another track, and subsequently shifted its tracks in connection with the building of a depot but within the right of way granted. In a suit to determine which company should bear the expense of maintenance of the relocated and new crossing, it was held that the steam railroad was the senior company in occupation with respect to both tracks, and not to have relocated its tracks by such shifting, and that the electric railway company, at whose instance the crossing was first installed, must bear the expense. [Macon Ry. & Light Co. vs. Southern Ry., 110 Southeast, Rep. 912.]

ILLINOIS — *Conditions Under Which Railway Property May Be Assessed for Street Improvements.*

Where property has for years been devoted to street railway purposes, and the evidence tends to show that it will continue so to be used for years to come, the only basis upon which a special assessment for street improvements may be levied against it is that the property will be benefited by the proposed improvement. For such purpose, the street railway property has no market value in the sense in which that term is ordinarily used, and, on objection by the street railway to assessment for improvements in street, the court erred in permitting an expert to testify that the property would sell for at least $16 per foot more after the improvement than before. [City of Chicago vs. Chicago City Ry. Co., 134 Northesat. Rep. 44.]

LOUISIANA — *Duty of Street Car Company to Prevent Obstruction of Platform by Objects Endangering Alighting Passengers.*

A street railway company owes to its passengers the duty to prevent the obstruction of the platforms by baskets or other objects which would endanger passengers when alighting. [Hopkins vs. New Orelans Railway & Light Co., 90 Southern Rep. 512.]

MICHIGAN—*Carrier Not Liable for Injury to Passenger Thrown Down by Speed of Car in Rounding Curve.*

A street railway company is not liable for injury to a passenger, who is thrown before he reached a seat, due to the rapid speed of the car necessary and incidental to efficient operating in rounding a curve immediately after starting. [Clifford vs. Detroit United Ry., 185 Northwest. Rep. 741.]

MARYLAND—*Company Held Liable for Death from Wire Broken by Fallen Limb of Tree if Chargeable with Knowledge of Decayed Condition of Tree.*

Where a large limb of a decayed tree extending out over a public highway broke and caused a railway transmission wire to come into contact with a wire fence, the railway was liable for injuries caused by contact with wire fence if, by the exercise of proper care, it could have known that the limb would probably fall and break its wires and did nothing to protect the public, even though the tree was situated on private property. [Hagerstown & Frederick Ry. Co. vs. State, 115 Altantic Rep. 783.]

MONTANA—*Verdict Exonerating Servant Releases Master.*

In an action for personal injury against a street car conductor and the company, where the company can be held liable only on the doctrine of respondeat superior, a verdict exonerating the conductor, while finding against the company, is inconsistent; the finding by the jury which will support one verdict would make the other one impossible. [Lowney vs. Butte Electric Ry. Co., 204 Pacific Rep. 485.]

NEW JERSEY — *Permission of Board of Public Utility Commissioners Necessary for Jitney Operation.*

A jitney which operates on a route parallel upon the same street to the line of a street railway, is a public utility. As such it must obtain permission to operate from the Public Utility Commission as required by Sec. 24 of the Public Utility Act, and municipal consent to operation is invalid without this permission. [Public Service Ry. Co. vs. Board of Public Utility Com'rs et al., 116 Atlant. Rep. 274.]

NEW JERSEY—*Users of Crossing Over Private Right of Way Without Consent Trespassers and Not Entitled to Warning.*

Where a crossing was constructed over a private right-of-way and track of a railway company without the consent or permission of the company and was used without invitation, the company is not guilty of willful or wanton injury if one of its cars strikes and damages a truck using the crossing, although the company has knowledge that the crossing is being used, and the view of a car approaching the crossing is somewhat obscured by shrubbery. [Staub vs. Public Service Railway, 117 Atlant. Rep. 48.]

NEW YORK—*Injury to Employee While Riding to Work on Pass Held Not to Be "Arising Out of Employment."*

Where a railway employee was riding on a pass to work but was injured before he reached the place where his employment began and before the time for which he was to be paid, the accident was not one arising out of his employment within Workmen's Compensation Law, and his representative could recover damages for his death in an action based on the theory he was a passenger. [Tallon vs. Interborough Rapid Transit Co., 134 Northeast. Rep. 327.]

PENNSYLVANIA—*Contract Not Consummated Because Terms Not Complied With.*

Where a railway wrote to a manufacturer asking the price on certain goods with terms, and the manufacturer gave price and terms, and the railway then replied, stating somewhat different terms, naming a consignee to whom the goods were to be shipped, a limit of time for shipment, and a certain place for delivery, there was no completed contract, where plaintiff did not reply to the last letter, but shipped the goods, consigned to itself, to a place other than that named by defendent. [Frick & Lindsay vs. Johnstown & S. Ry. Co., 115 Atlantic Rep. 837.]

SOUTH DAKOTA — *Knowledge of Peril Necessary Under Last Clear Chance Doctrine.*

Under the last clear chance doctrine, the defendant must have had actual knowledge of plaintiff's peril, and is not liable merely because he ought to have known thereof; the mere fact that he could have discovered the peril being insufficient. [Miller vs. Sioux Falls Traction System, 184 Northwest. Rep. 233.]

Personal Mention

L. A. Lovell Made Auditor

On Sept. 13 the board of directors of the Pacific Electric Railway, Los Angeles, Cal., announced the appointment of L. A. Lovell as auditor and secretary to succeed H. A. Culloden, who resigned to become auditor of the Minaret & Western Railway and its subsidiary companies at Fresno, Cal.

Mr. Lovell entered the service of the Pacific Electric Railway in 1901 with that portion of the present consolidated company known as the Pasadena-Los Angeles Electric Railway in the capacity of bookkeeper. During Mr. Lovell's twenty-one years of service with the company he has held various positions in the accounting department, including those of general bookkeeper and chief clerk. At the time of his appointment he held the position of special auditor.

L. A. LOVELL

Municipal Manager on Leave of Absence

Joseph S. Goodwin, general manager of the Detroit (Mich.) Municipal Railway, has been granted a six months leave of absence by the Detroit Street Railway Commission, due to ill health, and Mayor Couzens has announced that he will take active charge of the management of the railway during Mr. Goodwin's absence on leave. After being ordered by his physicians to take a complete rest, the general manager sent a letter to the Mayor explaining that after two weeks of observation at Harper Hospital he felt that in justice to himself and the Department of Street Railways he should relinquish, for the present, his active participation as head of the department.

Mr. Goodwin in his communication thanked the commissioners for the splendid co-operation and support which were rendered him at all times and assured them that he is determined to be back in fit condition energetically to push the progress of the department's affairs.

The commissioner agreed to grant Mr. Goodwin leave of absence on half pay and it has also been agreed between the Mayor and the commissioners not to appoint anyone to take Mr. Goodwin's place. The members of the commission and the Mayor will from now on devote more of their own time to the conduct of the department, the Mayor agreeing to spend a half of each day at the department headquarters during Mr. Goodwin's absence.

Paper Praises T. F. Hill

Among prominent men in Anderson, S. C., is Thomas F. Hill, superintendent of the commercial and railway departments of the local branch of the Southern Public Utilities Company. The Anderson *Tribune*, in fact, thought Mr. Hill of such importance that he was made the subject of a sketch in a series called "Anderson Men of Today." He is placed in the Anderson hall of fame for his ability to win friendships and his earnestness and interest in his work, qualities especially to be desired in an official of a public utility company.

After being graduated from Wofford College, Mr. Hill for a short time was baggage clerk for the Blue Ridge Railroad. He soon started work with the Anderson Traction Company, and when this company was purchased by the Southern Power Company Mr. Hill was made superintendent of the system. Later he took up his present work as superintendent of the commercial and railway departments.

Mr. McLimont Is Honor Guest at Dinner

To celebrate the fifth anniversary of his association with the Winnipeg (Man.) Electric Railway, officers and department heads of the company gave a dinner to A. W. McLimont at the Royal Alexandra Hotel on Oct. 11. The banquet was not only in honor of the fact that Mr. McLimont, vice-president and general manager, had been with the company five years, but because, as stated by one of the company, he "has successfully eliminated jitney competition, succeeded in getting the fares raised, has almost completely rehabilitated the property, and has completely transformed public opinion from being adverse to the company to now being favorable," and "because he has won the confidence of everyone."

Mr. McLimont stated that efficient selling of the electric railway product will remove the necessity of government regulating bodies and will "remove from politics the use of the public services of the communities as political footballs."

Mr. Wood Bus Head

Manager for Receiver of New York Railways Elected to Guide Fifth Avenue Coach Company

Frederic T. Wood, who has been identified with the transportation development of New York City for more than twenty years and who most recently was assistant to Job E. Hedges, receiver for the New York Railways, has been elected president and general manager of the New York Transportation Company and the Fifth Avenue Coach Company. Mr. Wood succeeds John A. Ritchie, who resigned recently to become head of the reorganized Chicago Motor Bus Company and the American Motor Bus Corporation.

Mr. Wood brings to the Fifth Avenue Coach Company a wide knowledge of bus transportation, gained through years of trained observation and actual experience in New York City and in the principal capitals of Europe. He was trained in the same school of transportation as Mr. Ritchie and possesses the same aims and ideals. It is Mr. Wood's objective to carry on the same principles that have made the Fifth Avenue Coach Company one of the most talked of transportation systems in the country.

F. T. WOOD

Mr. Wood is a graduate of Williams College, through which he worked his way. He entered the transportation business twenty years ago with the old Interurban Street Railway at the office of the company in Christopher Street. That was in the horse car days. He has been identified with every progressive movement in transportation in the city since then and enters the motor coach field with a singular knowledge of the ways and means of constructing and maintaining a modern public service corporation. For the time being, at least, Mr. Wood also will fill the vacancy caused by the resignation of George A. Green, vice-president, general manager and chief engineer of the Fifth Avenue Company, who will join Mr. Ritchie in Chicago.

Mr. Wood is a trustee of Williams College and was president of the Williams Club for two years.

John Garrett Barry—*An Appreciation*

His Recent Appointment as a Vice-President of the General Electric Company Celebrated at a Dinner Given by His Friends as a Tribute to His Great Service to the Industry

On Thursday evening at the Hotel Commodore, New York, a company of more than 175 men prominent in the electric railway industry gathered at a dinner given in honor of John Garrett Barry. It was a personal tribute from old friends, in celebration of Mr. Barry's recent appointment as a vice-president of the General Electric Company. It voiced a universal sentiment among the men both of the railways and the railway supply manufacturers, a recognition of the distinguished services which Mr. Barry has rendered to the industry during the twenty-eight years that he has been active in this field.

For Mr. Barry has been a great constructive influence in railway affairs. As a member of the executive committee of the American Electric Railway Association he has long been in the inner counsels and has helped to guide the organization and the industry through one of the most difficult periods of railway history. As one of the three members of the finance committee, created last year, he has been most instrumental in placing the association's management and operation on a real financial basis. He has been a great conservative force, a source of sound judgment, but above all else a strength in action, a power for getting things done. This is probably the outstanding characteristic of Mr. Barry's appealing personality, responsible in large measure for his remarkable success.

The story of Mr. Barry's career is an interesting one. He was born in Boston in 1868 and was graduated from the Boston High School at seventeen and went directly to work. Some five years later he entered the employ of the Thomson-Houston Company at Lynn in the training course of the construction department. After a year he went to the Boston office and in 1894 when the General Electric Company was formed he transferred to the railway department, then one of the two major divisions of the company. The problems and opportunities of these pioneer days in electric railroading appealed to Mr. Barry strongly. There was work to be done. There were obstacles to be surmounted. There were puzzling situations to be thought through, as in the creation of any new industry. He became intensely interested and set himself to the task of helping to solve these problems and to develop these opportunities with the belief that the street railway might be lifted through successful electrification to an entirely new plane of public service.

From that time on Mr. Barry has been a conspicuous figure in the evolution of this important branch of the electrical industry. He has a tremendous capacity for work, fortunately coupled with perfect health and a temperament that maintains a good natured poise, proof against the worry and excitement that drag down so many men. He possesses an ability to drive himself under close concentration. He is regular, systematic and rapid in his work and quick in his decisions. All this carried him ahead and in three years he was assistant manager of the department. By 1907 he was manager.

JOHN GARRETT BARRY

The business side of the industry attracted Mr. Barry more than the technical. The practical problems of organization, finance and management in these early days of expansion were ever present and here his sound judgment and clear vision served him and the industry well. Also he is a man of great human understanding and he has the wonderful gift of inspiring men to loyalty, enthusiasm and effort. He therefore soon developed marked organizing ability and strong qualities of leadership and in 1917 was rewarded with appointment to the position of general sales manager of the company, while still retaining the direction of the railway department. Then last June came the further advancement to a vice-presidency, after thirty-two years of service.

If there is one thing that has distinguished the work of John Barry, it has been this remarkable ability of his to get things done. Men turn to him in difficulties and he is ever ready to undertake the task if he feels its urgency and thinks that he can help. But he is a believer in facts. His experience in the affairs of the industry has been a broad one. And he draws on this experience for the knowledge on which he forms his well balanced judgments and supports his vision. Mr. Barry has, therefore, brought great impulse to the promotion of research and development. He has defended this fundamental of progress against the restricting influences of economy programs. And yet, though ready to spend money without hesitation in this creative work, his influence has ever been to steady and make sure. What interests him most, however, is always the practical opportunity to get some good thing done.

Mr. Barry's record is not one of spectacular high spots. He is distinctly the wheel-horse type, self-made. But linked with his great personal capacity for work is his broad human sympathy that has won him a host of friends who admire and love him and has given him knowledge of men. He is a good judge of what people will think and do. In fact, one of his great services to the American Electric Railway Association has been his almost unfailing ability to interpret the point of view of the manufacturers on matters affecting the industry broadly and to guide the councils wisely in the common interest. He is a strong man and he has been intensely occupied, but he has ever maintained the closest human contact with the men with whom he has been associated and devoted a large amount of thought and time to the encouragement and development of young men and the upbuilding of loyalty and higher ideals of achievement in any organization with which he has been connected. His promotion as vice-president of the General Electric Company has been called "the most popular appointment of recent years."

At the dinner Toastmaster Frank Hedley, president of the Interborough Rapid Transit Company, epitomizing the speakers of the evening, pictured Mr. Barry in these words:

> John Barry is a deserving boy from the East who has grown up and developed by his own personal energies. Those energies were recognized by his superiors, and they have put him up and up—not in order to help John Barry, but in order always to put the best man in the job. We regard John Barry as a real man among men.

Joseph K. Choate, vice-president of the J. G. White Management Corporation, said:

> Barry was not a technically educated man, but after he got through with his technical associates and then with those with whom he tried to trade, he became more of a technical man than those who tried to teach him that he was not a technical man.

Gerard Swope, president of the General Electric Company, said that people always knew where Mr. Barry stood. It was a great satisfaction to him when Mr. Barry was made vice-president, and this satisfaction was greatly increased when he realized the respect in which Mr. Barry was held in all parts of the country. J. R. Lovejoy, vice-president of the General Electric Company; Daniel W. Smith, Detroit; Charles C. Peirce, Boston; Judge Daniel Naylon, Schenectady, and Judge James H. Wilkerson, Chicago, also added their tributes.

Mr. Barry in replying said among other things that naturally he was greatly pleased with his promotion to the vice-presidency of the company, but he was still more pleased and greatly touched by the testimonial which had been extended to him at the dinner. He would regard the evening as one of the happiest experiences of his life.

Mr. Barry is a resident of Schenectady and has given generously to public work as president of the Board of Education and as Fuel Administrator of that district during the war. He is a director in the Schenectady Savings Bank and the Schenectady Trust Company and a member of the Board of Trade. He belongs to the Mohawk Club and Mohawk Golf Club of Schenectady, American Institute of Electrical Engineers, American Electric Railway Association and the Engineers', Bankers' and Lotos Clubs of New York.

Obituary

C. D. Meneely

Charles Dickinson Meneely, vice-president and treasurer of the Brooklyn Rapid Transit Company, died on Oct. 22 at his home in Hempstead of heart disease.

Mr. Meneely was born Aug. 11, 1860, at Watervliet, N. Y. He received his education at the Boys' Academy, Albany, and the Graylock Institution, Williamstown. He was graduated from Union College, Schenectady.

His first business experience he obtained under the guidance of his father in the firm of George R. Meneely & Son, manufacturers of railroad supplies at Watervliet. On Feb. 1, 1896, he came to the Brooklyn Rapid Transit as auditor. Four years later he was elected assistant secretary and treasurer and within a month became secretary and treasurer. He succeeded Col. Timothy S. Williams, who was elected vice-president the same day.

On Feb. 11, 1911, the new office of vice-president and member of the board having been created, Mr. Meneely was chosen by the directors to be its first incumbent. He also filled the position of treasurer. When the B. R. T. went into the hands of a receiver, Dec. 31, 1918, Mr. Meneely was retained by Lindley M. Garrison as treasurer for the receiver.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE
MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

The Convention Exhibits and the Progress They Typified

Manufacturers Concentrating on Equipment to Reduce Costs, Increase Safety, and Lessen Labor Expense—Complete Display Made of Both Cars and Buses—Maintenance Problem a Topic of Discussion

IN SIZE and variety the exhibits at this year's convention of the American Electric Railway Association met all expectations. The arrangement was particularly effective and the change of surroundings from that of previous conventions added a variety and newness that was pleasing to all. The large number of new devices shown indicated the serious consideration manufacturers are giving toward producing equipment for reducing costs, insuring increased safety and lessening the labor necessary for maintenance and operation. Car builders took advantage of this opportunity to exhibit the latest development in large, light-weight cars for one-man operation. One of the new one-man double truck cars of the Chicago Surface Lines was contrasted with one of the first Chicago horse cars. Exhibits of sweepers, work cars, etc., showed notable advances.

The display of buses and accessories was the most complete ever gathered at any convention. Seven manufacturers exhibited ten city type motor buses, five interurban coaches and two trolley buses, all of which were of the latest design. Comfort for passengers and easy riding were outstanding characteristics. These bus exhibits attracted considerable attention.

The trend of truck construction for electric cars was seen to be toward a simplification of parts and reduction in weight. Several new arrangements of truck brake equipment showed particular advances in simplification. Motor manufacturers laid particular stress on the development of small-sized motors and other equipment for light-weight double-truck cars, laying particular stress on the use of four small motors rather than two larger ones. Important features included light weight, large capacity, self-ventilation and increased strength of parts, due to the use of high-grade materials. Developments in control equipment were toward increased insulation at vital points and liberal contact surfaces to take care of arcing.

Exhibits of car equipment accessories reflected the increasing use of one-man operation and the resulting provisions for lessening the duties of the operator and for increased safety to passengers. Seat designs provided increased comfort for passengers. Electric heaters reduced the fire hazard over former types of such heaters and gave more uniform distribution of heat. Exhibits of slack adjusters, gear cases, brakes, brake rigging and trolley wheels showed advances toward reducing maintenance costs. The exhibits of door operating mechanisms and equipment, trolley catchers, trolley bases, and hand brakes, showed improvements for lessening the duties of the operator, particularly where one-man operation is used.

The exhibits of fare boxes, registers, change carriers, tickets, and the like were more elaborate than at previous conventions. Provisions for automatic instantaneous registration of fares and reducing the labor of the operator were outstanding characteristics. Thirteen displays of fare boxes of the lock and registering type, change makers, coin counting and separating machine, coin wrappers, ticket and fare registers, badges, etc., showed the completeness of the equipment available to lessen the labor and insure honesty in handling revenue received. Other exhibits of particular interest to those maintaining car equipment consisted of certain fixtures, doors, bearings, carbon brushes, headlights, lighting fixtures, shade holders, hand straps, destination signs, step treads, ventilators, window sash and fixtures, roof materials, side panels, paints, varnishes, wire and cables, fire extinguishers, lock nuts, bolts and washers.

The exhibits of shop tools were confined principally to small equipment, such as jacks, hoists, coil spreaders and winders, and labor saving equipment. Exhibits of sanitary and wash room supplies were very good.

Those responsible for the maintenance of track and line found much to interest them. Various exhibits of rails, substitute ties, special trackwork, and the like were very complete and showed developments to produce longer life with less maintenance. Equipment for track maintenance, such as welders, grinders, and rail benders showed particular advances. The display of overhead and line material offered many useful lessons. New designs of insulators gave increased protection from short circuits and extreme weather conditions. Combination railway and lighting poles showed the tendency toward reducing the amount of property installed on the streets. Exhibits of suspension line material contained everything used from the trolley ear to the section insulator.

Probably one of the greatest advantages which came to those in attendance was from meeting manufacturing experts and through a discussion of problems confronting the men directly responsible for maintenance and operation.

G. H. Knutson Joins Spooner & Merrill

Spooner & Merrill, consulting engineers, Grand Rapids, Mich., announce a new partnership and the opening of a Chicago office in the Harris Trust Building. George Henry Knutson, formerly with the Harris Trust & Savings Bank, has assumed personal charge of the Chicago office as resident partner.

Mr. Knutson, it is understood, expects to confine his activities essentially to "experting," financing and refinancing of public utilities, although he will continue to carry on a general consulting engineeering practice. In several respects the combination of talent as now embraced within the firm is an unusual one. Messrs. Spooner and Merrill are actively engaged in engineering, construction, rate work, appraisals and valuations, and practically everything along consulting engineering lines. Mr. Knutson will be actively engaged in financing, but in addition knows the consulting engineering field. In this way the firm as now constituted offers to investment bankers, trust companies and to industrial enterprises a complete service not ordinarily offered by the consulting engineer or banker.

Both Mr. Spooner and Mr. Merrill are natives of Grand Rapids, and both have degrees in civil engineering from the University of Michigan. Mr. Spooner has had a broad experience in civil engineering and valuation work and as an expert in engineering litigation. Mr. Merrill's work has, perhaps, been a little more closely confined to engineering work in the field. As for Mr. Knutson, he also was graduated from the University of Michigan. His experience has been especially broad, more particularly in the field of financial engineer, in which capacity he has reported on the impending purchases of utility properties and their security issues by bankers and then followed through to their conclusion the issuance of the securities, also looking after the details relative to the fulfillment of the provisions covering the items of sinking funds, reserve funds, maintenance provisions, etc.

Metal, Coal and Material Prices

Metals—New York	Oct. 24, 1922
Copper, electrolytic, cents per lb	13.812
Copper wire base, cents per lb	15.625
Lead, cents per lb	6.55
Zinc, cents per lb	7.35
Tin, Straits, cents per lb	35.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$7.125
Somerset mine run, Boston, net tons	3.95
Pittsburgh mine run, Pittsburgh, net tons	3.25
Franklin, Ill., screenings, Chicago, net tons	3.25
Central, Ill., screenings, Chicago, net tons	2.00
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	6.50
Weatherproof wire base, N.Y., cents per lb.	16.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N.Y., cents per gal.	91.50
White lead, (100-lb. keg), N.Y., cents per lb.	11.625
Turpentine, (bbl. lots), N.Y., per gal	$1.64

Rolling Stock

City Railway, Dayton, Ohio, is rebuilding fifteen of its class 100 cars for one-man operation. The new Cincinnati trucks will be used under these cars to replace Maximum traction trucks.

Grand Rapids (Mich.) Railway is converting seventeen of its closed cars for operation by either one man or two men. As soon as these have been completed it is intended to put an additional twenty cars through the shop for similar changes.

Norfolk & Western Railway Roanoke, Va., has placed an order, through its consulting engineers, for four double cab electric locomotives similar to those now in use on the Elkhorn Grade electrification. These locomotives will be equipped for operation over the alternating-current installation. The capacity of the new locomotive will be somewhat greater than those now in operation, but the design will still maintain the special feature of split-phase operation. The machine will be of the jackshaft and siderod type, weighing approximately 382 tons. This recent addition to the rolling stock is a result of the increased heavy freight traffic.

Track and Roadway

Everett, Wash.—The City Council has accepted a formal agreement embodying terms reached at an informal conference of officials of the city and representatives of the Puget Sound International Railway & Power Company, giving the company an extension of time on paving between tracks on Hewitt Avenue.

New York, N. Y.—The Transit Commission has authorized the construction of an elevated railroad station on the Broadway "L" of the Brooklyn Rapid Transit Company at Williamsburgh Bridge Plaza. The new station is to cost in the neighborhood of $300,000. Plans are now well advanced for the work. The commission has given instructions that they be completed as soon as possible, and that the necessary form of contract be prepared.

Trade Notes

Conveyors Corporation of America, 326 West Madison Street, Chicago, Ill. has appointed the George W. Fife Engineering Company, 1403 Merchants Bank Building, Indianapolis, Ind., its representative for the sale of American trolley carriers in the state of Indiana. The American trolley carrier is equipment for handling coal from railroad cars to bunkers, silos or open storage pile. It consists of an overhead monorail, with a trolley from which a 1-ton bottom dump bucket is suspended.

Dwight P. Robinson & Company, Inc., New York, N. Y., have been awarded a contract for the construction of a cement mill at Birmingham, Ala., for the Lehigh Portland Cement Company of Allentown, Pa. The mill will have a capacity of 1,000,000 bbl. a year.

M. C. McElligott, president of the Canadian Cleveland Fare Box Company, Ltd., Preston, Ont., who also represents the Universal Lubricating Company and other organizations in Canada, is understood to be prepared to take on several new accounts. Mr. McElligott put in more than twenty years in the electric business in the United States, so that he has a real practical knowledge of the business.

"War Surplus," just issued by the Sales Promotion Section of the Office of the Director of Sales, describes in a general way the methods of sale resorted to by the War Department in the disposal of its vast stocks of surplus property and tells what these stocks contain. A loose-leaf insert lists the more important sales scheduled for the near future. Catalogs of sales usually are ready for distribution two weeks before the date of the sale. Requests for catalogs should be made to the Chief Sales Promotion Section, Room 2515, Munitions Building, Washington, D. C.

New Advertising Literature

Sprague Electric Works, New York, N. Y., has issued Sheet No. 67,901, descriptive of the Sprague safety type panelboards and cabinets.

Ballard, Sprague & Company, Inc., New York, N. Y., has issued a twenty-page booklet describing the Ballard-Sprague chimney service and boiler settings.

Benjamin Electric Manufacturing Company, Chicago, Ill., is distributing a pocket catalog No. 23. The book is 5 in. x 6½ in., and contains 250 pages devoted to the illustration and description of the company's electrical products.

The Martindale Electric Company, Cleveland, Ohio, has issued a chart 10 in. x 14 in. showing causes and effects of carbon brush and commutator troubles. This chart is put up in a form which will be of great assistance in locating and correcting troubles on direct-current motors and generators.

Metal & Thermit Corporation, New York, N. Y., has issued the fourth edition of its Thermit Locomotive Pamphlet No. 21, which is of special interest to all railroad superintendents of motive power, general foremen, blacksmith foremen and Thermit welders. The new pamphlet contains many revisions since the last edition was published, chief among which are instructions for applying important improvements in practice in Thermit welding which have been developed by exhaustive research. The drawings and instructions illustrating and describing making Thermit welds in various parts of locomotive frames and other locomotive and railroad equipment have been completely revised since the publication of the last edition to conform to the improved practice.

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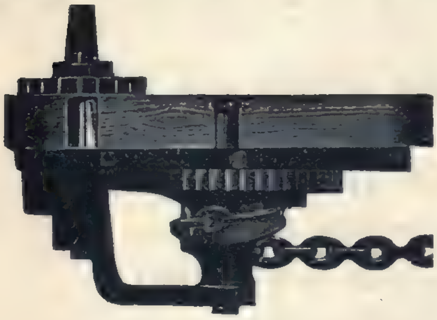
Has been developed with, and grown up beside the standard safety car. Their rugged simplicity and their absolute dependability, recommend them as an essential part of safety car equipment.



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Increased safety is gained, together with a reduction in hand brake maintenance costs, where Peacock Brakes are used. Repairs on Peacock Brakes are seldom needed. One big installation went five years without requiring any repair work.

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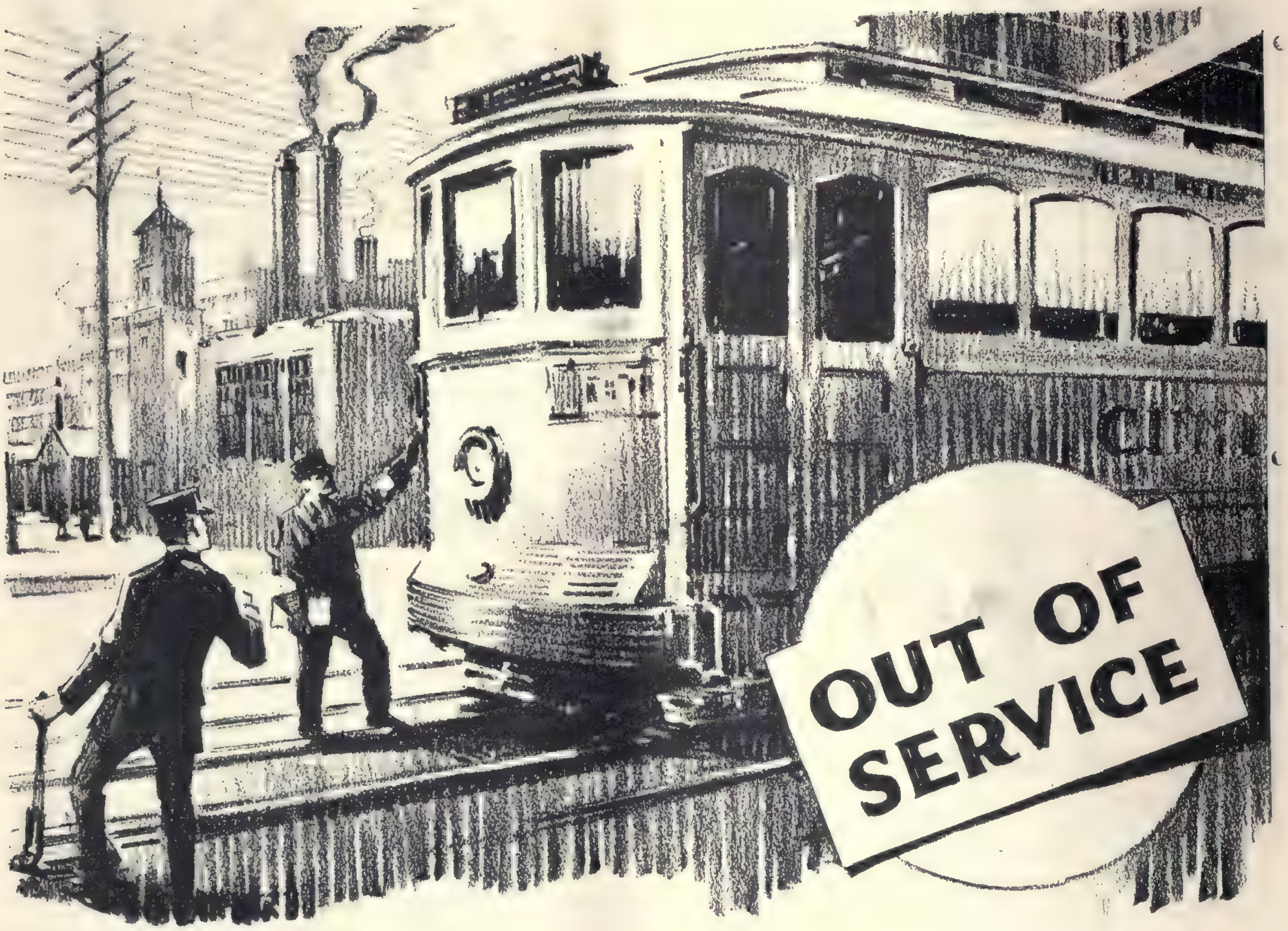

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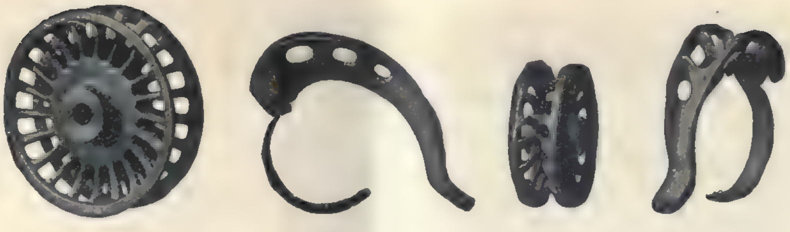

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- Bronze, reversing
- Malleable Iron, operating
- Malleable Iron, operating, adj. type
- Malleable Iron, operating, with bronze or steel bushings
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- Journal Check Plates
- Turnbuckles

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E. Allison Thornwell, 1513 Candler Bldg., Atlanta, Ga.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.

Tired Steel

MITTEN-TRAYLOR MOTOR BUSES are insulated against shocks of the road.

Axles, frames, steering arms, all of the thousand and one steel parts of a motor bus, are daily subjected to the pounding of a hundred hammers — road shocks!

Under this punishment steel loses its resistance, crystalizes — SNAPS — then an accident!

HIFLEX SPRING SUSPENSION (not just a shock absorber) protects Mitten-Traylor Motorbuses, cushions the bumps of the road, saves gasoline — every bump takes its toll in gas — and eliminates side-sway and operator's fatigue.

Send for MITTEN-TRAYLOR bulletin today.

MITTEN-TRAYLOR
INCORPORATED
Philadelphia

MITTEN
TRAYLOR

A Business Motive Power

The time must come when all businesses will consider the advisability of advertising in the same spirit that a manufacturer ponders over the advisability of adopting a new machine. One does not install a piece of labor-saving mechanism because it suits his fancy; but because the efficiency of the business requires it.

He expects the new machine to reduce his cost to operate—perhaps to make a better product—and thus aid him in meeting competition and making larger profits.

Advertising is exactly similar. The man who refuses to consider it as a possible expedient, simply shuts his eyes on one of the problems of his business. He might as well ignore the banks as sources of credit when he has need to borrow capital.

On the other hand, the man who looks to advertising to checkmate all weaknesses and shortcomings of his business and to carry it along to victory despite these, has a childlike faith in the miraculous.

Advertising will not make his product or his service any better than they are; but it will bring him the full benefits of their merits. It will not eliminate wastefulness in his factory or his store; but it will reduce his cost to operate. It will not make illogical selling methods successful; but it will assist good selling methods, and often point the way for improving them.

Advertising is the most inexpensive motive power that the manufacturer or merchant can buy today. It is a form of stimulus that brings excellent returns on the investment.

[Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies]

The Genuine!

There is only one "Guaranteed Penetration Process" - its "the P & H". It guarantees- in writing - a **full one half inch** uniform penetration throughout the ground line area.

A written guarantee goes with every shipment of "P & H Guaranteed Penetration Process" poles agreeing to refund the butt-treating price on any pole that does not have the full specified half-inch penetration.

The "P & H" Guaranteed Penetration Process

gives you absolutely certain results no guesswork. For the most reliable pole service - for the longest pole life - insist on the genuine "P & H"

We can fill any pole needs - for Butt-Treated and untreated Northern White and Western Red Cedar poles - or for any form of Butt-Treatment.

Prompt Shipment assured by the convenient location of our yards in the North Central and Western States.

Our interesting folder on the Butt-Treatment of cedar poles will tell you the why and wherefor of the "P & H Guaranteed Penetration Process." Write for a copy.

Copyright, 1922 by P & H Co.

"P & H" Guaranteed Penetration Process Poles in lines of Chicago, North Shore and Milwaukee R. R.

PAGE AND HILL CO.

MINNEAPOLIS, MINN.

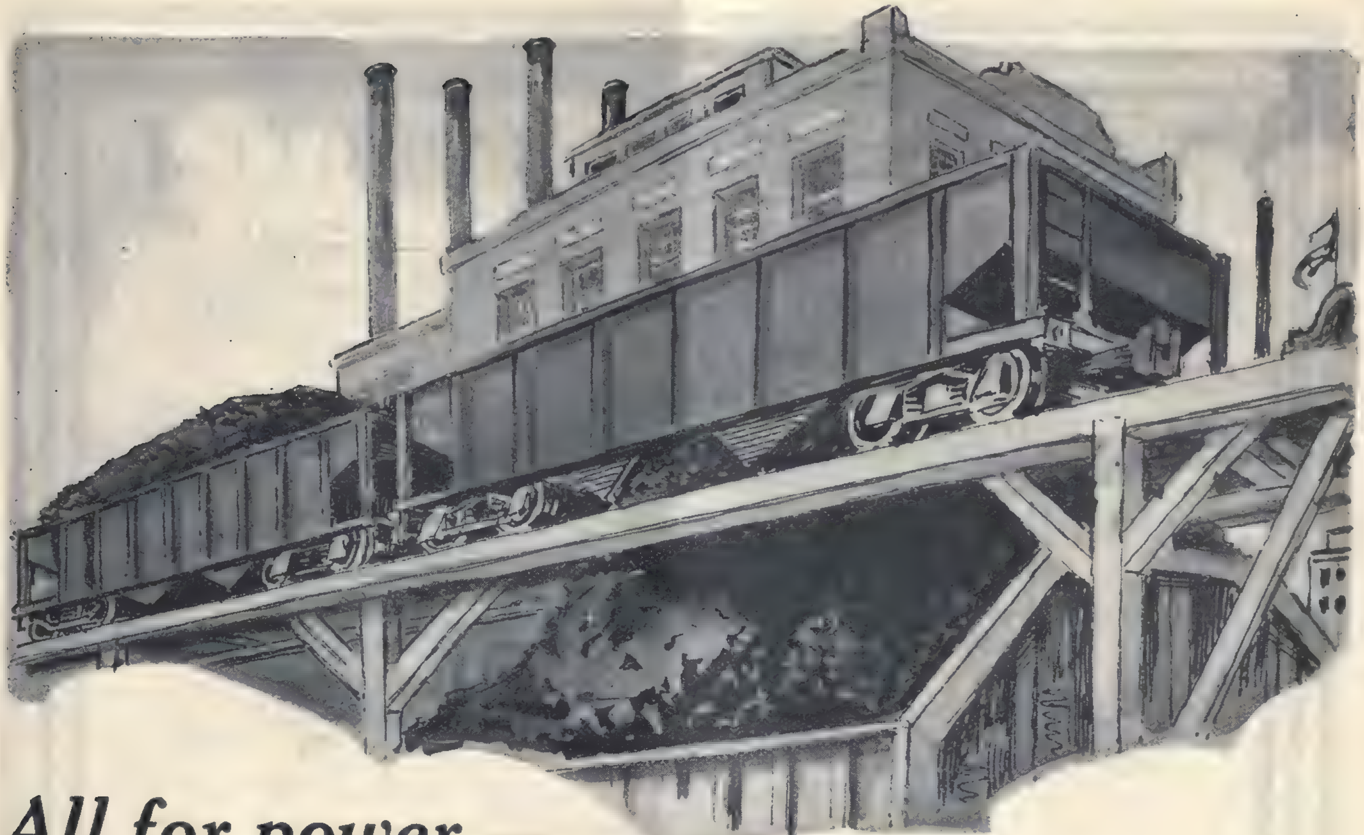
Grand Rapids, Mich., Powers Bldg.

New York, N. Y. 50 Church St.
Chicago, Ill., 19 So. LaSalle St.
Kansas City, Mo. 717 Bryant Bldg.
Omaha, Neb., 513 Electric Bldg.
Houston, Texas, 1111 Carter Bldg.
Dallas, Texas, 311 Sumpter Bldg.
Buffalo, N. Y. 950 Ellicott Sq. Bldg
Louisville, Ky. 1416 Starks Bldg.

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.

CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier
INCORPORATED
CANDLER BLDG NEW YORK



All for power — not for coal burning heaters!

Winter's coming! What about the coal supply?

With coal strikes and railway strikes, priority orders to worry about, and rising prices, a pound of coal in the bunkers is going to be almost as precious as a pint of water in the desert. Don't be handicapped by having to buy coal for car stoves also.

CONSOLIDATED

Car Heaters with Thermostatic Control Limit Current Consumption

Don't depend on trainmen to economize on current for heating. They are too busy with other duties. With Consolidated Thermostatic Control a constant temperature is maintained, and the current consumption is kept down to a minimum. The car temperature is maintained at exactly the right point, and regulation is absolutely automatic.

Consolidated Electric Heaters with Thermostatic Control are recognized nearly everywhere as the ideal car heating equipment.

Do not fool with imitations of the real thing; equip with Consolidated Electric Heaters with Thermostatic Control for practical savings of the winter's coal supply.

Write now for quotations and information on the *New Visible Thermostat*—Vital parts exposed to view, yet amply protected —Eliminates malicious destruction of thermostats.

New Visible Thermostat

Cross Seat Electric Heater

CONSOLIDATED CAR HEATING COMPANY = CONSOLIDATED CAR HEATING COMPANY = CONSOLIDATED CAR HEATING COMPANY

CONSOLIDATED CAR HEATING CO.
Albany
New York **Chicago**

M ARMATURE BABBITT J

No better babbitt than M-J Armature has been devised, for railway motor bearings. This brand stands supreme—the result of countless tests and service records. It goes farther, lasts longer and can be used over and over again.

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri

TROLLEY WHEELS:
V-K *Oil-less.* M-J *Lubricated*
HARPS: V-K *Non-Arcing*

BEARINGS: *"Tiger" Bronze*
Axle and Armature

ARMATURE BABBITT
and Similar Products

MORE-JONES QUALITY PRODUCTS

$14,000.00 worth of brand new gears salvaged from scrap by "Tool Steel" WISDOM TOOTH pinions.

Here's the story: A large elevated railway line had had so much trouble with pinion breakage, (they had tried every manufacturer), that they changed from the standard tooth shape to a 20° stub for strength. In making the change, they discarded $14,000.00 worth of brand new gears, mostly "Tool Steel," because the gears had the old tooth shape and would not interchange with their new tooth. They were afraid to use the gears with any make of pinion because they would surely have occasional breakage.

In place of scrapping, at our suggestion, they mated these gears with "Tool Steel" *Wisdom Tooth* pinions, stronger at the root, and by this slight change at insignificant cost were able to salvage $14,000.00 worth of gears.

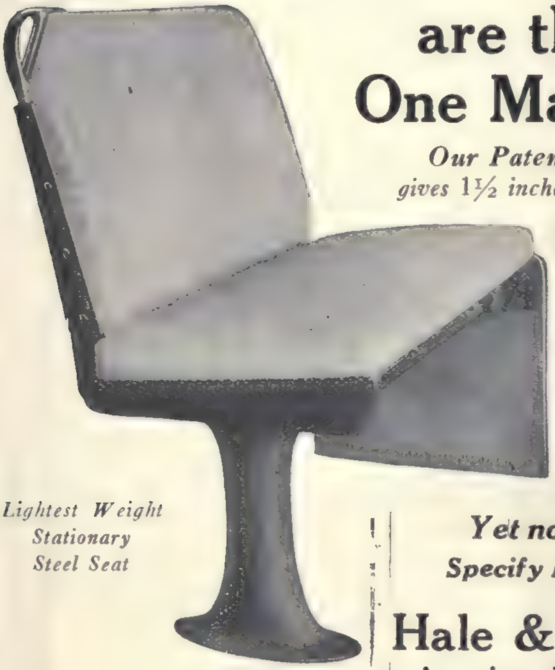
The Wisdom Tooth is not a "cure all" but it has cured and is curing some very serious troubles.

THE TOOL STEEL GEAR & PINION CO.
Cincinnati, Ohio

HALE & KILBURN SEATS

are the BEST for One Man Safety Cars

Our Patented Space-Saving Feature
gives 1½ inches more space for each Passenger



Lightest Weight Stationary Steel Seat

Lightest
Strongest
Simplest
Neatest

Lightest Weight Walkover Steel Seat

Yet no higher in price than others
Specify H & K Seats for Your New Cars

Hale & Kilburn Corporation
American Motor Body Company, *Successors*
PHILADELPHIA

New York Chicago Washington Atlanta San Francisco Los Angeles

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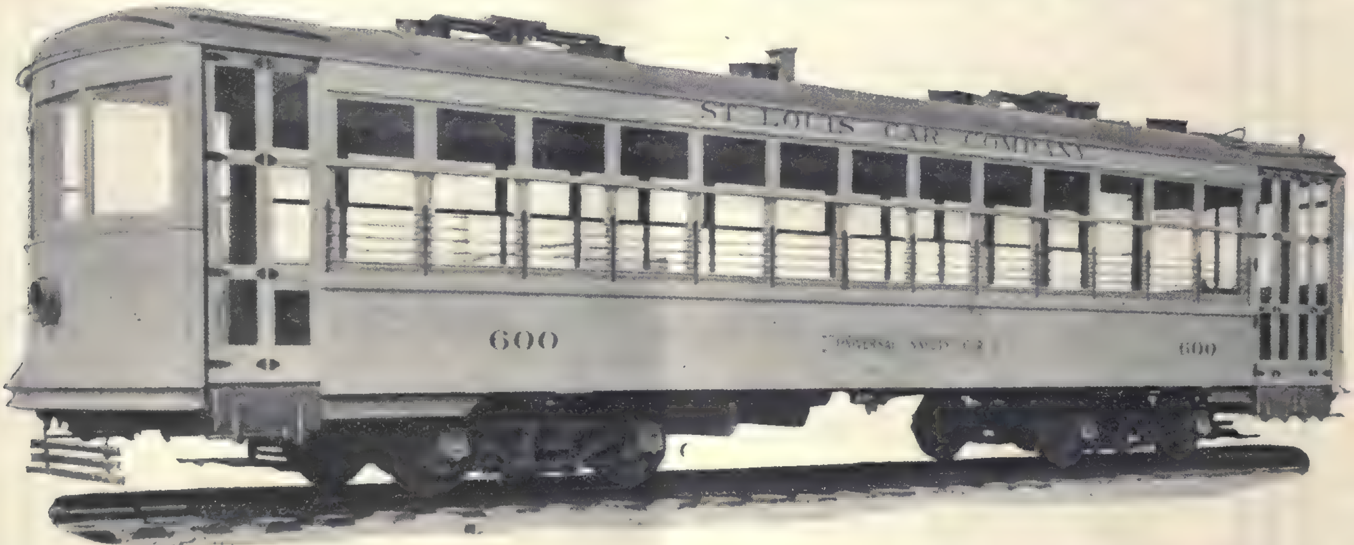


The "UNIVERSAL" SAFETY CAR

A St. Louis Quality Car

Did you investigate this at the Convention?

If not—then do it now! It's the latest most carefully designed type of light-weight, double-truck car for one-man or two-man operation. Has a seating capacity of 54 passengers.

Write us for full details.

St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

"RIMCO" Insulated Screw Driver

Tested and passed at 5,000 volts by Electrical Testing Laboratories of N. Y. City.

The only SAFE Screw Driver for linemen and all high tension work

7½". 8½". 10½"

Semi-soft rubber insulation bonded to metal by Elchemco process. Insulation cannot crack or work loose.

RUBBER TRADE RIMCO MARK PRODUCTS REG. U.S. PAT. OFF.

Rubber Insulated Metals Corporation

50 Church Street, New York City, U. S. A.

Distributed by The Electric Service Supplies Co., and other distributors

Export Distributor, International Western Electric Co.

AMERICAN ELECTRICAL WORKS. AMELECTRIC Wires and Cables PHILLIPSDALE, R.I.

Reg. U. S. Pat. Office

Galvanized Iron and Steel Wire and Strand

Incandescent Lamp Cord

AMELECTRIC PRODUCTS

BARE COPPER WIRE AND CABLE

TROLLEY WIRE

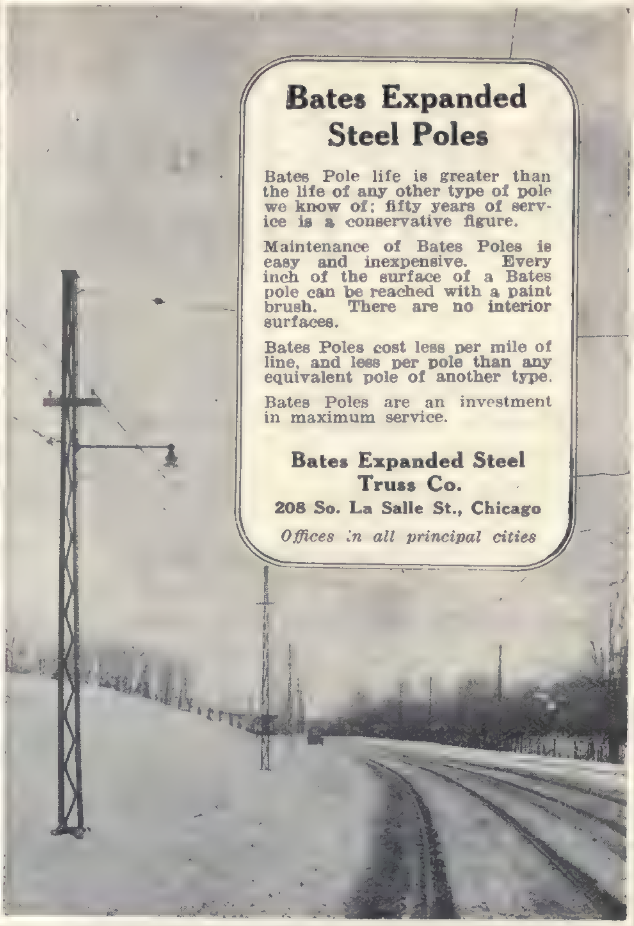
WEATHERPROOF WIRE AND CABLE

PAPER INSULATED UNDERGROUND CABLE

MAGNET WIRE

AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way.



Bates Expanded Steel Poles

Bates Pole life is greater than the life of any other type of pole we know of; fifty years of service is a conservative figure.

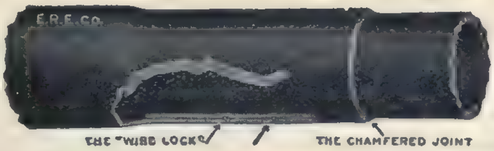
Maintenance of Bates Poles is easy and inexpensive. Every inch of the surface of a Bates pole can be reached with a paint brush. There are no interior surfaces.

Bates Poles cost less per mile of line, and less per pole than any equivalent pole of another type.

Bates Poles are an investment in maximum service.

Bates Expanded Steel Truss Co.
208 So. La Salle St., Chicago
Offices in all principal cities

ELRECO TUBULAR POLES



COMBINE

Lowest Cost	Lightest Weight
Least Maintenance	Greatest Adaptability

Catalog complete with engineering data sent on request.

ELECTRIC RAILWAY EQUIPMENT CO.
CINCINNATI, OHIO
New York City, 30 Church Street

International Creosoting & Construction Co.

Galveston, Texas

Plant—Texarkana Beaumont Galveston

MONEY SAVERS TO RAILWAYS

Treated railway ties, poles, piling, bridge timbers, etc.

See our full page advertisement in last week's issue.

Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.

NASHVILLE TIE COMPANY

Cross Ties: White Oak, Chestnut, and Treated Ties. Oak Switch Ties.

Prompt shipment from our own stocks.

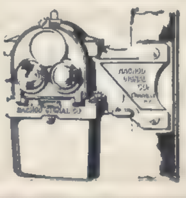
Headquarters—Nashville, Tenn.

A. D. Andrews, Terre Haute, Ind., Representative.

AUTOMATIC SIGNALS

Highway Crossing Bells
Headway Recorders

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KY.



U.S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

U. S. Electric Contact Signals

for

- Single-track block-signal protection
- Double-track spacing and clearance signals
- Protection at intersections with wyes
- Proceed signals in street reconstruction work

United States Electric Signal Co.
West Newton, Mass.

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDERED
TRIPLEX

Arc Weld and Flame Weld

Send for new
Rail Bond book

American Steel & Wire Company
CHICAGO
NEW YORK

High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
COMPLETE LAYOUTS
IMPROVED ANTI-KICK BIG-HEEL SWITCHES
HARD CENTER AND MANGANESE
CONSTRUCTION

New York Switch & Crossing Co.
Hoboken, N. J.

ANACONDA TROLLEY WIRE

ANACONDA COPPER
MINING COMPANY
Rolling Mills Department
CHICAGO, ILL.

ANACONDA
from mine to consumer

THE AMERICAN
BRASS COMPANY
General Offices
WATERBURY, CONN.

Ramapo Iron Works
Established 1881

Ajax Forge Company
Established 1883

RAMAPO AJAX CORPORATION
Successor
HILLBURN, NEW YORK

Chicago New York Superior, Wis. Niagara Falls, N. Y.

Automatic Return Switch Stands for Passing Sidings
Automatic Safety Switch Stands
Manganese Construction—Tee Rail Special Work

BARBOUR-STOCKWELL CO.
205 Broadway, Cambridgeport, Mass.
Established 1858

Manufacturers of
Special Work for Street Railways
Frogs, Crossings, Switches and Mates
Turnouts and Cross Connections
Kerwin Portable Crossovers
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

SPECIAL TRACKWORK

Of the well-known WHARTON Superior Designs *and* Constructions

Steel Castings
Converter and
Electric

Forgings
Drop Hammer
and Press

Gas Cylinders
Seamless
Steel

Wm. Wharton Jr. & Co. Inc., Easton, Pa.
(Subsidiary of Taylor-Wharton Iron & Steel Co.,
High Bridge, N. J.)

ORIGINATORS OF
MANGANESE STEEL TRACKWORK

Corrugated Culverts

"ACME" (Nestable) and IMPERIAL Riveted Corrugated Culverts. Made of anti-corrosive Toncan Metal. Write for prices.

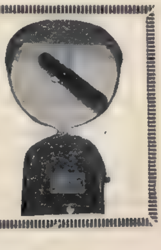
THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches

Albert & J. M. Anderson Mfg. Co.
289-93 A Street Boston, Mass.
Established 1877
Branches—New York, 135 B'way.
Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, E. C. 4, 38-39 Upper Thames St.

INSULATED WIRES AND CABLES
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY



Chapman
Automatic Signals
Charles N. Wood Co., Boston

THE INDIANAPOLIS SWITCH & FROG CO., SPRINGFIELD, OHIO

Indianapolis Economy Products That Make Dollars "Grow"

Indianapolis Solid Manganese:
Frogs, Crossings, Mates and Tongue-switches. Super-quality material. Par-excellent designs. Gives many lives to one, of ordinary construction, and when worn down, CAN BE RESTORED by INDIANAPOLIS WELDING.

Indianapolis Electric Welder:
Efficient, Rapid, ECONOMICAL, Durable. Price, $2.00 (per day for three hundred days) thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

Indianapolis Welding Steel:
Fluxated heat treated Metal Electrodes, insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untreated.

Indianapolis Welding Plates:
Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and COUNTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

Indianapolis Welding Supplies:
CABLES, HELMETS, LENSES, CARBONS.

Turntables:
Ball-bearing, for ash-pits, storage yards, etc.

Indianapolis "Economy" Products
are Pre-eminently "Money Savers," YES—"Money Makers" for Electric Railways.

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES
BOSTON, 49 Federal Street
PHILADELPHIA, North American Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
FORT WORTH, TEX., Flatiron Building
HONOLULU, H. T., Castle & Cooke Building

WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES
DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705 6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

Series Type
Arc Welding and Bonding Outfit

Rugged series resistance coil
Indestructible Mica insulation
Normal welding current at half voltage

The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO RAIL BONDS

W & B
"Railroad Special"
Wrenches

Unexcelled for Heavy Duty
Practically indestructible
7 sizes, 6 to 21 inches.

Screw Wrench Book?

J. H. WILLIAMS & CO.
"The Wrench People"
BROOKLYN 143 Richards St.
BUFFALO 143 Vulcan St.
CHICAGO 1143 W. 120 ST.

FOSTER SUPERHEATERS

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

POWER SPECIALTY COMPANY, 111 BROADWAY, NEW YORK

Boston Philadelphia Pittsburgh Kansas City Dallas Chicago San Francisco London, Eng.

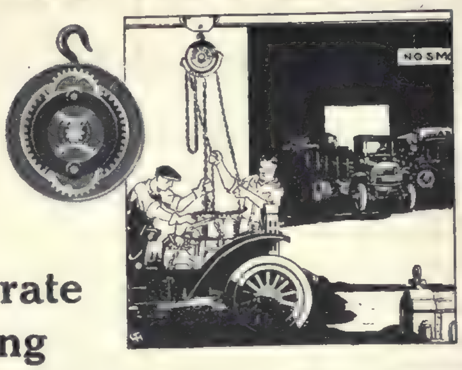
STERLING VARNISH

Manufactured by electrical engineers who will understand your insulating problems and render intelligent service. Noted for uniformity and quality. It will pay you to get in touch with

The Sterling Varnish Co., Pittsburgh, Penna.

Tickets and Cash Fares.
THE CLEVELAND
accommodates both
The Cleveland Fare Box Co.
CLEVELAND OHIO
Canadian Cleveland Fare Box Co., Ltd.,
Preston Ontario

FORD TRIBLOC



For Accurate Placing

THE Tribloc lowers its load gently and accurately into place. To understand *why,* one has only to examine the planetary gear system. Such a well balanced drive insures absolute *smoothness of operation*—whether in lifting or lowering. No matter how carelessly operated, a Tribloc will never jump, jam, or jerk under its proper load.

Write for information on any type or capacity to 40 Tons.
2217-D

FORD CHAIN BLOCK CO.
2ND & DIAMOND STREETS PHILADELPHIA, PA.

OVER-SEAS REPRESENTATIVE
ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
51 CHAMBERS ST. NEW YORK, U.S.A.
PARIS BRUSSELS TURIN BARCELONA RIO DE JANEIRO

FORD·TRIBLOC

RAILWAY MOTOR BRUSHES

N C C
COLUMBIA
812

Grade 812 has been proved by test the most economical and satisfactory brush obtainable for standard flush or slotted commutator railway motors in local or moderate speed interurban service. One of a series of standard railway motor brushes.

COLUMBIA BRUSHES
COST NO MORE — LAST LONGER
NATIONAL CARBON COMPANY, INC.
CLEVELAND, OHIO SAN FRANCISCO, CAL.

THE WORLD'S STANDARD

"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.
Sales Representatives in the Principal Cities

TULC
A
LUBRICANT

We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment.

The Universal Lubricating Co.
Cleveland, Ohio

SUPER-SEASONED FIBRE

Peerless Insulation Paper has 25 to 50 per cent higher electrical resistance.

S-S
TRADE MARK

Hornflex Insulation Paper has no grain. Folds without cracking.

NATIONAL FIBRE & INSULATION CO.
Box 423, Wilmington, Delaware

HACKSAW
HIGH SPEED
GLADIUM
ECONOMY
EFFICIENCY
BLADES
GLADIUM CO. Inc. 34 Cliff St. New York

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.

Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

---

A Single Segment or a Complete Commutator
is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

FLOOD CITY
Rail Bonds and Trolley Line Specialties
Flood City Mfg. Co., Johnstown, Pa.

BUCKEYE JACKS
high-grade R. R. Track and Car Jacks.
The Buckeye Jack Mfg. Co.
Alliance, Ohio

Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Islands in the Indian Ocean. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

SALES OFFICES:

Heywood Wakefield Co., 516 West 34th St., New York.
Heywood-Wakefield Co., 1415 Michigan Ave., Chicago.
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
Railway and Power Engineering Corp., Toronto and Montreal.
G. F. Cotter Supply Co., Houston, Texas.

DON'T FORGET

to consult the

SEARCHLIGHT SECTION

of this issue

It may hold the very opportunity for which you have been seeking

If you do not find what you want, perhaps a small ad will help you.

DISPLAYED ADS
$5 or less per inch

UNDISPLAYED ADS
***Positions Wanted*—4 cents a word**
***All Others*—8 cents a word**

0168

Type R-10

International Registers

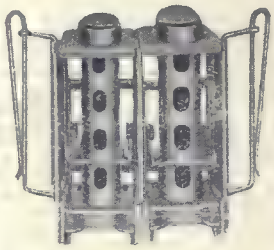
Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
15 South Throop Street, Chicago, Illinois

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels, to suit his personal requirements and to facilitate the addition of extra barrels.

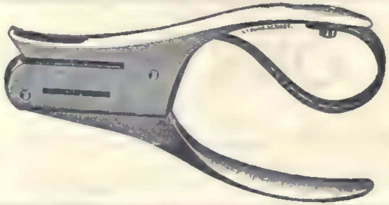
JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

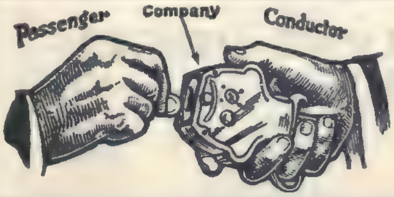
141-151 WEST 22D ST. Chicago, Ill. — *Write for Catalogue* — 1328 Broadway New York, N. Y.



A Style for Every Service

Send for Catalog

BONNEY-VEHSLAGE TOOL CO.
Newark, N. J.



Direct Automatic Registration
By the
Passengers

Rooke Automatic Register Co.
Providence, R. I.

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

SEARCHLIGHT SECTION

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches	$4.50 an inch
4 to 7 inches	4.30 an inch
8 to 14 inches	4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

WANTED a good secretary also superintendent of a hydro-electric interurban railway company. This is said to be the second best iron mining district in the United States. Don't lose time but come at once. Room 1, First National Bank Bldg., Iron River, Mich.

POSITIONS WANTED

ENGINEER of way and structures, eight years in present position in charge of design, maintenance and construction, also electric welding work with fully up-to-date company operating electric, railway and gas utilities; age 40, married; best references. PW-472, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT with successful record as statistician and operating head, experienced in interurban, safety car and bus operation, can get desired results, satisfactory relations with present employer, personal reasons for desiring change. Address, PW-469, Electric Railway Journal, Leader-News Bldg., Cleveland, O.

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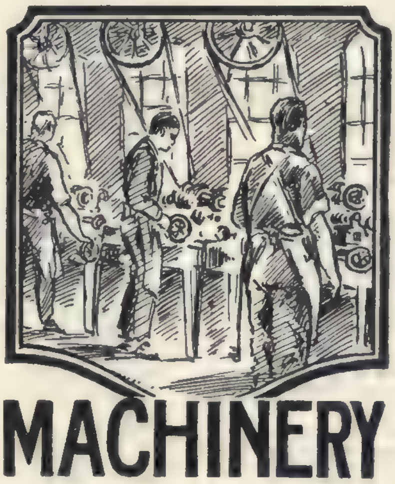

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Anchors, Guy
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- Ohio Brass Co.
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- Ramapo Ajax Corp.

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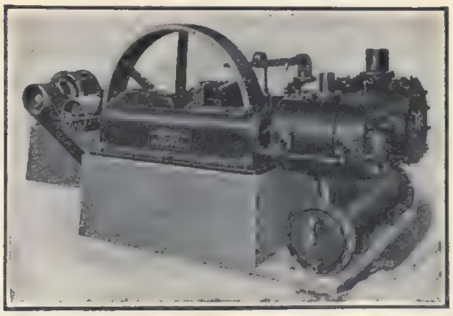

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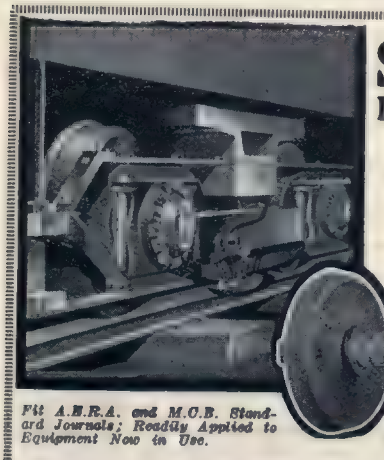

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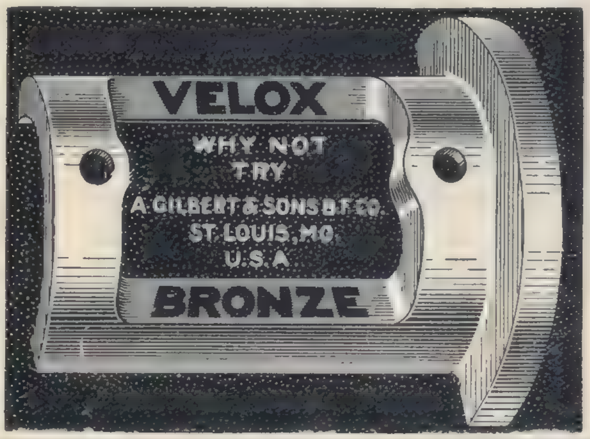
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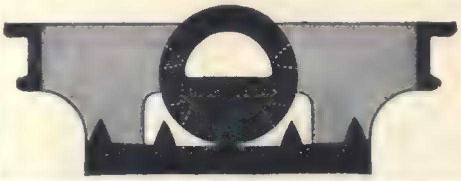

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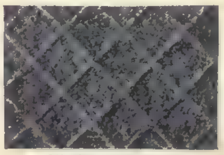

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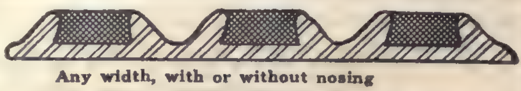

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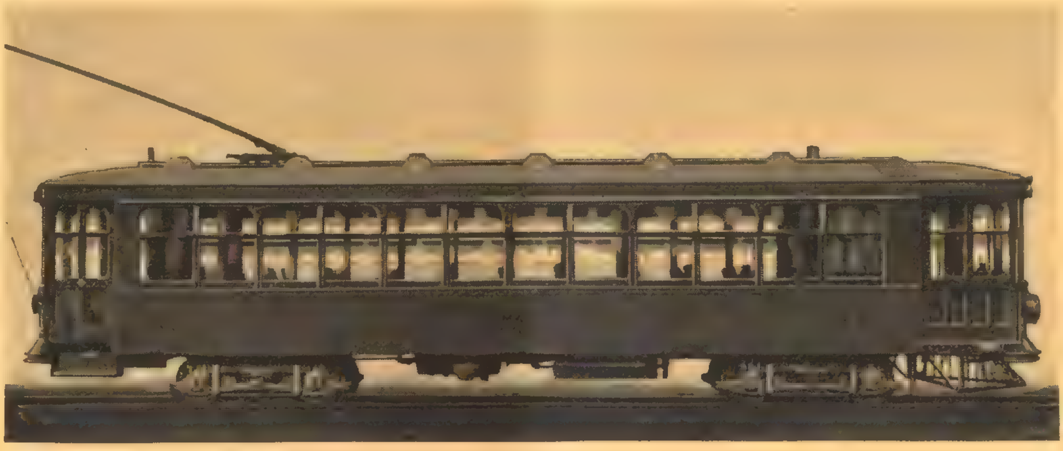

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